

PLANNING FOR A CHANGING ENVIRONMENT:  
ADMINISTRATION AND MANAGEMENT OF SOUTH GEORGIA

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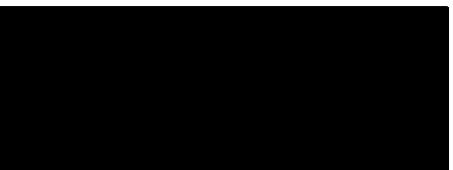
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Pamela B. Davis

## Abstract

The administration and management of South Georgia's fauna developed through the regulation of the sealing and whaling industries of the late 19th and 20th centuries. These regulations began as economic measures to benefit the industry with little thought given to preserving stocks. The relative success of the elephant sealing and whaling industries brought into focus the necessity of conservation measures to preserve stocks. Other measures to protect wild animals and birds were introduced on South Georgia as well. The first comprehensive approach to conservation came in 1975, when the Falkland Islands Dependencies Conservation Ordinance was established to protect the island's fauna and flora. This ordinance used as its basis the Agreed Measures for the Conservation of Antarctic Fauna and Flora but additionally provided for Areas of Special of Tourist Interest, anticipating the growth of tourism on South Georgia. The growth of tourism is one of the new challenges facing the island's ecosystems and raises the question of whether the 1975 Ordinance provides sufficient control. Specific information on the numbers of tourists and other visitors, the sites visited, and the measures controlling it are presented. Administrative response to tourism and other changes, including those caused by fur seal and reindeer populations and the fisheries industry surrounding the island, is assessed in light of other management plans: Macquarie Island Nature Reserve Management Plan and the Graefe et al model of Visitor Impact Management. Recommendations and conclusions are made based on that assessment.

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## INTRODUCTION

### PLANNING FOR A CHANGING ENVIRONMENT: ADMINISTRATION AND MANAGEMENT OF SOUTH GEORGIA

"All biological systems change, adapting to the pressures acting on them. Species become extinct or evolve to new forms. The composition of communities changes and new communities replace earlier ones when the physical environment alters....Man has greatly accelerated the rate of change of biological systems throughout the world....so a need was seen for action to lessen or reverse the changes brought about by Man's pressure on his environment. Such actions constitute conservation (Bonner, 1990:386)."

South Georgia's "biological system" is comprised of subantarctic flora and fauna which has responded to the changing pressures of man's activities. Some of the early conservation measures in the Antarctic region were a direct response to the overexploitation of resources closely associated with South Georgia: sealing and whaling.

The management of these activities and others gained international focus and led to the formation of the Antarctic Treaty and to a succession of conservation measures within the Treaty of increasing scope and complexity such as: the Agreed Measures for the Conservation of Antarctic Fauna and Flora (Agreed Measures), Convention for the Conservation of Antarctic Seals (CCAS), Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) and finally the Protocol on Environmental Protection to the Antarctic Treaty (Environmental Protocol). The gradual evolution of Antarctic conservation strategies is the result of the philosophical and practical necessities of deciding how to conserve (protect from harm) and preserve (maintain) the area's resources.

Heap and Holdgate (1986:198) see the Antarctic Treaty System (ATS) as,

" a management tool .... From an environmental standpoint, the primary element in the treaty system is the requirement that the unique features of the Antarctic environment be safeguarded and made available to people of all nations for scientific research and their peaceful enjoyment. The ultimate objective of the treaty as an environmental mechanism is the harmonization of utilitarian, conservation, and aesthetic values."

Ironically, South Georgia has a relatively unusual position in this context. Although geographically, it lies within the Antarctic Convergence and is therefore part of the Antarctic region, it is not part of the politically defined boundaries of the Antarctic Treaty System. Consequently, like some other islands of the Southern Ocean, it is not covered by the Antarctic Treaty, though its waters and to some degree its marine animals are covered by some of the Treaty's conventions. Though claimed by both Argentina and Great Britain, it is governed exclusively as British territory. This singular political identity allows for environmental impact to be studied and management policy instituted with a flexibility not possible within the ATS.

The administrative body responsible for South Georgia's management is facing new challenges, from both natural and man-made sources, as are the other islands in the Southern Ocean. However, while most other subantarctic islands have formulated or are developing their management plans, South Georgia's plan has not been revised since its last major overhaul in 1975, when previous measures were consolidated and updated.

A key concept in responding to changing environmental conditions is the defining of management objectives and ongoing

monitoring of those conditions (Angel, 1987), (Abbott and Benninghoff, 1990). Wilderness areas are, as Passmore (1980:102) suggests, "valuable not only as economic resources, actual and potential, but as providing opportunities for the pursuit of science, for recreation and retreat, as sources of moral renewal and aesthetic delight." Decisions about whether South Georgia's resources, are being conserved for something in the present or future, or conserved from destruction or extinction, need addressing. Holdgate (1970:925) saw the "restoration or stabilisation" of the ... few remaining undisturbed ecosystems on oceanic islands north of 60° S" as one of three principal management objectives for the Antarctic region. For islands like South Georgia this task can be carried out only by the governments which claim responsibility.

This study addresses two questions: To what degree does existing legislation cover new demands on South Georgia's resources, in particular tourism? Do these new challenges signal the need for changes in present management legislation and policy?'

Just as it is management's task to evaluate and assess the status of a system, so too will the eight chapters of this thesis examine South Georgia's ecological system and its management. The first chapter is a description of the island and its flora and fauna, in order to recognize the potential value and the interrelationships of its ecosystems. The second chapter outlines the development of protection measures which first served the immediate economic needs of the sealing and whaling industries on South Georgia, and led to the current legislation under which the island is managed. To assess the effectiveness of current

legislation, Chapters 3, 4, and 5 discuss some of the new pressures of the island's ecosystems, including wildlife management, the fisheries industry, and scientific parties and ecotourism. Chapter 6 analyzes an empirical management system currently in use on Macquarie Island, an island similar in many respects to South Georgia. Chapter 7 introduces Graefe et al's (1990) model of Visitor Impact Management (VIM), a more practical approach to management, based on a model which has been applied with some success to managing visitor impact in United States national parks. Finally, Chapter 8 considers these models in relation to current conservation policies in South Georgia, and suggests ways in which these policies might be improved for the better protection of the island's ecosystems.

CHAPTER 1  
SOUTH GEORGIA  
AN ACCOUNT OF THE AREA

1.1. Physical Description

In his search for a southern continent, Captain James Cook discovered South Georgia. Taking formal possession of South Georgia for Britain he described it as, "Lands doomed by Nature to perpetual frigidness, never to feel the warmth of the Sun's rays, whose horrible and savage aspect I have not words to describe" (Headland, 1982). Climate and travelling conditions today are different from those experienced during Cook's 1775 visit: global temperatures were probably lower and glaciers more advanced. However, the general aspect of a remote, savage wilderness that repelled Cook now draws visitors to South Georgia in ever-increasing numbers.

The following brief physical description is based on Headland's (1984) account of the island.

South Georgia lies in the Atlantic sector of the Southern Ocean, between latitudes  $53^{\circ} 56'$  and  $54^{\circ} 55'$  S and longitudes  $34^{\circ} 45'$  and  $38^{\circ} 15'$  W. A crescent-shaped island roughly 170 km long and from 2 to 30 km wide, it has an area of approximately 3755 km<sup>2</sup>. Surrounding it are a number small islands and rocks including (moving counterclockwise): Shag Rocks to the northwest, the Willis Islands and Bird Island both closer and off the northwestern tip, Annenkov Island the largest island located midway down and off the western coast, and the Pickersgill Islands, much smaller and

approximately 20 km further east. Rounding Cape Disappointment to the eastern coast (named by Cook after verifying that it was not a part of the Antarctic continent), is Cooper Island and, near the northern corner, the Bay of Isles containing many small islands. Clerke Rocks are grouped as a part of South Georgia though they lie some 70 km southeast (Figures 1.1 and 1.2). Remote from other continents and islands, its nearest neighbors are the South Shetland Islands (550 km), the South Orkney Islands (1030 km), and the Falkland Islands (1450 km) (Figure 1.2).

Two mountain ranges, the Allardyce Range (containing Mount Paget the highest peak at 2934m) and the Salvesen Range, together form the backbone of the island. A major topographical feature is the permanent ice and snow which covers approximately 60% of the island. Some 163 glaciers have been recorded, of which about 50 have been named. The largest glaciers, the Brogger, Neumayer, Nordenskjold, Esmark, and Novosilski, make up roughly one-fourth of the total ice cover of the island.

Figure 1.1 Location map of South Georgia

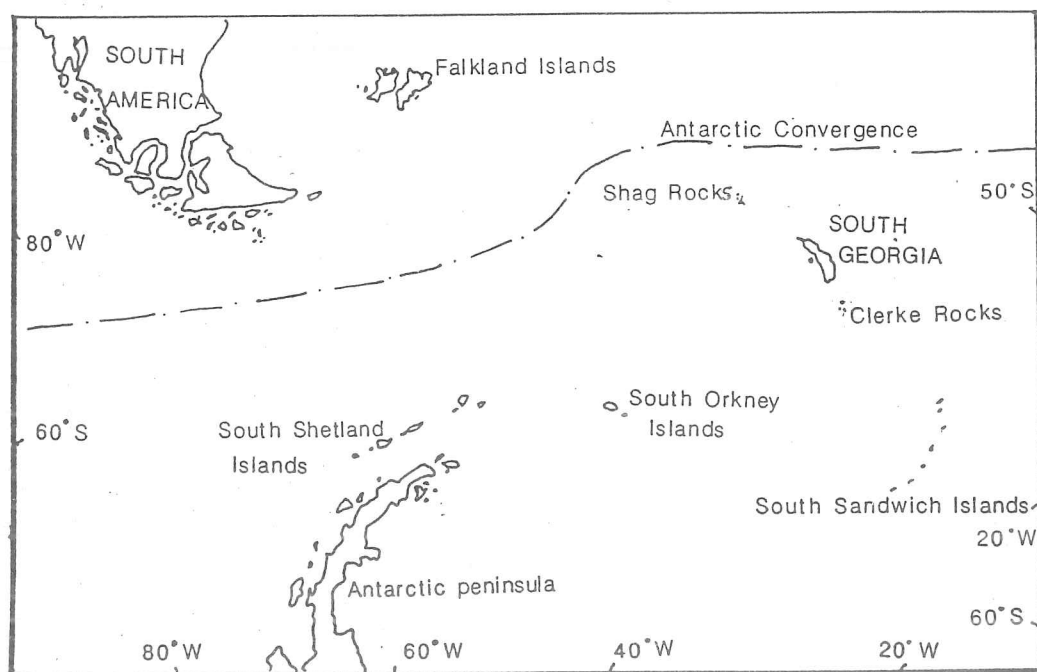
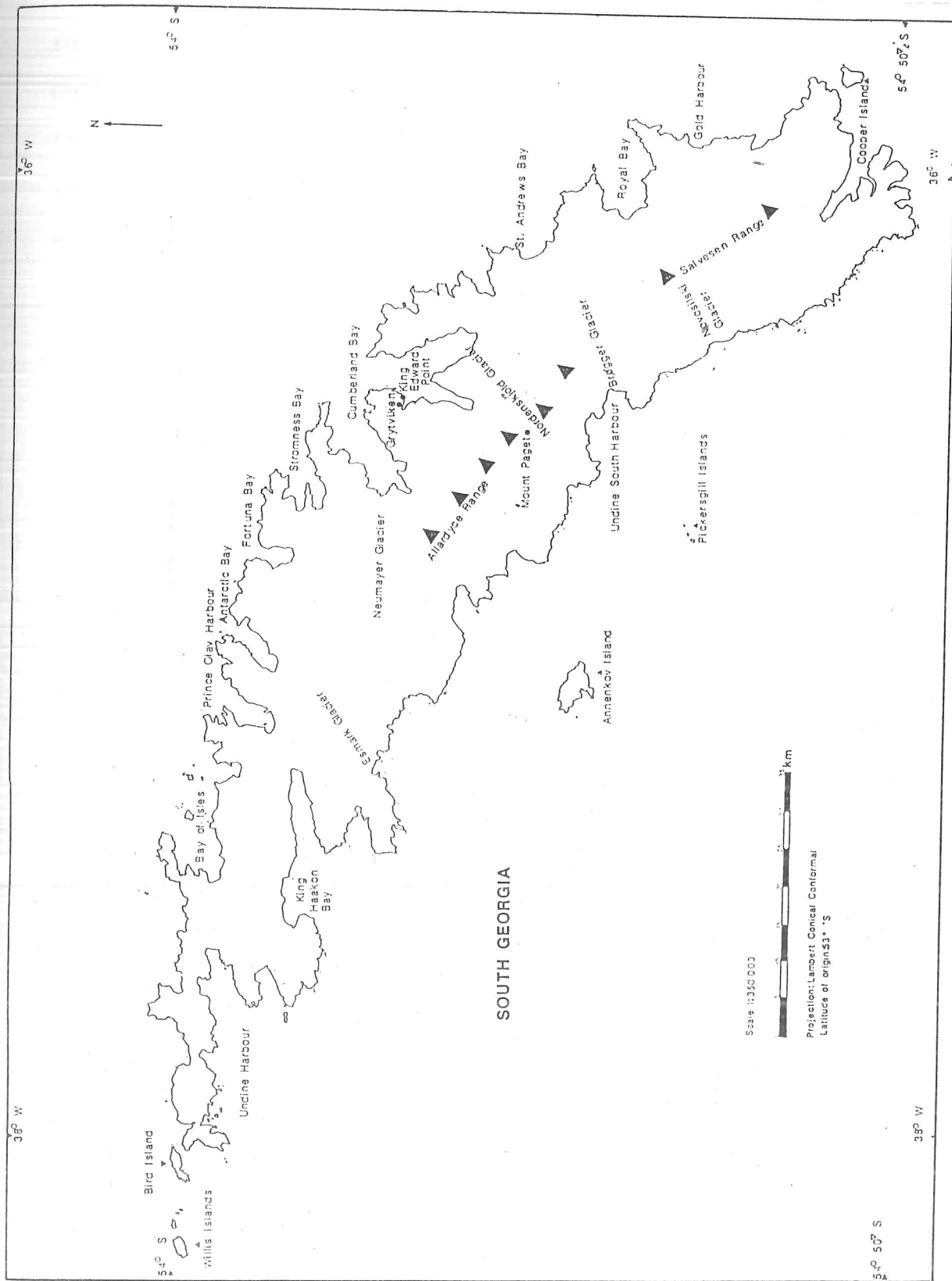




Figure 1.2 Map of South Georgia



From the valleys flow summer melt water and rainfall run off, resulting in streams and waterfalls. Pools and ponds are year-round features and retreating glaciers have given rise to several lakes: Gulbrandsen Lake, with its icebergs and terraced shoreline (recording the lake's previous levels), may be the most visually interesting. Only two rivers are officially recognized: the Hope River running into Undine Harbour and Penguin River at Cumberland Bay.

### 1.2 The climate

In the southern hemisphere the boundary of polar climate is defined as one within the 10°C isotherm for the warmest month. Within this boundary lie all of Antarctica, the tip of South America, Tierra del Fuego, and a number of oceanic islands including South Georgia, Marion and Prince Edward Islands, Iles Crozet, Iles Kerguelen, Heard and MacDonalld Islands, and Macquarie Island. Within the definition of Stonehouse (1989: 82), South Georgia is a periantarctic island. A summary of monthly meteorological tables from King Edward Point (where records have been maintained for much of this century) shows a small monthly mean temperature range, with means above the freezing point from September to May (Table 1.1). Air temperatures are controlled mainly by those of the waters in which South Georgia lies. Located some 350 km south of the Antarctic Convergence, it is marginally colder overall than similar islands (Iles Kerguelen and Crozet) in the Indian Ocean, and Macquarie Island in the Australian sector (Selkirk and others, 1990).

Table 1.1 Monthly air temperature at South Georgia  
(From Headland, 1984)

Month	Air temperatures °C
Jan.	+4.9
Feb.	+5.6
Mar.	+4.8
Apr.	+2.7
May	+0.3
June	-0.8
July	-1.5
Aug	-1.2
Sept.	+0.3
Oct.	+2.1
Nov.	+3.2
Dec.	+3.9

However, while its climate places it well within the polar regions, its relative lack of sea ice in winter and relatively rich flora and fauna, mark it as representing a subantarctic zone.

South Georgia's winds are noteworthy, originating from at least three sources. First, the strong westerlies prevailing in a wide latitudinal zone (in the region of the Drake Passage) often reach South Georgia in the form of gales. Second, katabatic winds sweep down valleys and give rise to violent whirlwinds -- "williwaws" -- which have been known to blow aground vessels anchored in the harbours. Fohn winds, the third type of wind common to South Georgia, result from the appearance of damp air at the windward (west) side of the island, which condenses releasing precipitation (usually snow) on the heights. On the leeward side relatively dry air warms as it accelerates down the north-eastern

side of the island. Föhn winds can raise temperatures at King Edward Point as much as 10° C in 10 minutes, melting snow and ice.

### 1.3 Flora

Table 1.2 Numbers of Subantarctic plant species on selected islands  
(From Stonehouse, 1989)

<u>Locality</u>	<u>Lichens</u>	<u>Mosses</u>	<u>Liverworts</u>	<u>Ferns</u>	<u>Angio- sperms</u>
South Georgia	160	175	85	7	19
Iles Kerguelen	120	85	45	8	22
Heard I.	52	16+	?	0	8
Macquarie I.	55+	75	60	5	34

#### 1.3.1 Sources of flora

The major influences on the flora of south polar regions are the geographic isolation of the land masses within the vast Southern Ocean, the short, cool or cold growing seasons and the seasonal lack of liquid water. On the subantarctic islands, in contrast with continental Antarctica, there are sufficient moisture and mature soils at sea level to provide a terrestrial environment for a range of flora. South Georgia has a richer variety of plants than other subantarctic islands in similar latitudes (see Table 1.2).

Though isolated from other land masses, some 64% of South Georgia's flora is Fuegian, i.e., related to that of the Falkland Islands, Tierra del Fuego, and Patagonia, sharing the clear influences of prevailing west to east winds and currents in these latitudes (Lewis Smith, 1984:74). The flora includes also elements

of bi-polar or world-wide distribution (Headland, 1984), probably introduced by wind (*ibid.*). Birds also carry the barbed or hooked seeds of Acaena, Uncinia species and Ranunculus biternatus, playing a major role in dispersal of these forms in the subantarctic islands (*ibid*:68): fur seals and elephant seals on South Georgia may also be implicated. E. rubrum, a persistent alien on South Georgia, is thought to have been brought by skuas (*ibid*:77).

The variety and distribution of South Georgia's flora are in most cases much greater than on other subantarctic islands. The lichens, for example, are more numerous by taxa, and have drawn from a wider range of sources: 35% have bi-polar distribution. Of the vascular plants only Phleum alpinum is bi-polar: 25% are cosmopolitan, 16% belong to the Fuegian element, 10% to the Fuegian-New Zealand-subantarctic islands element and 8% to an Antarctic element; there are no endemics (*ibid.*).

### 1.3.2 Early botanical exploration

The published record of flora begins with Cook's landing on the island and the accounts and observations of his naturalists. Until the International Polar Year of 1882-83, the island was visited primarily by whalers and sealers who added little botanical information. One of them, James Weddell, visited Undine Harbour (which he called Adventure Bay) in 1823, and reported that the crew ate bitter greens and saw abundant vegetation in the valleys (Greene, 1964:7).

The first major attempt at a botanical inventory of the island was made by H. Will during the visit of the German International Polar Year Expedition to Royal Bay (*ibid.*). Beginning in 1902, C. Skottsberg, the botanist for the Swedish South Polar Expedition,

studied the Cumberland Bay area and began to develop a more extensive record of the island's vegetation (ibid:9). These contributions were further expanded by the Falkland Islands Dependencies Survey (FIDS) during 1945-62, and later by Greene's (1964) comprehensive report which included a systematic account of the island's vascular flora. This information was consolidated into a complete list of native and alien vascular flora by Greene and Walton (1975). This thorough documentation of plants and plant communities is a most valuable asset for conservation, forming a baseline against which changes to the system can be assessed, and management decisions made with a greater degree of confidence.

### 1.3.3 Vascular flora

Today, there are more alien vascular species (35) than native (26), but of these only five are widespread on the island. The majority of alien species were introduced accidentally during the whaling era. With two exceptions, Poa annua, a weedy grass of world-wide distribution, and Cerastium fontanum, a chickweed, they are still found only near sites of human habitation (Headland, 1984:204).

### 1.3.4 Non-vascular flora: mosses, liverworts, lichens

On South Georgia non-vascular plants significantly outnumber vascular (Table 1.2). Prominent among the moss flora is the genus Tortula. Two of the eight species, T. robusta and T. geheebiaeopsis, are very common constituents of the bryophyte vegetation and often form the understorey to Acaena shrubs. The remaining six species tend to be local and rare, occupying dry rock faces and crevices as well as bogs, flushes, and streamsides (Lightowlers, 1985:41).

Liverworts are commonly associated with the mosses in wetter areas. The closely appressed thalli of Marchantia and Schistochila species sometimes form a firm mat in flush areas (Headland, 1984:199).

#### 1.3.5 Plant communities

The richness of the communities and their comparatively unaltered state attracts many scientists to continue investigating and cataloguing their characteristics and interrelationships with the island's fauna. Some of these are discussed in Chapter 3.

Lewis Smith (1984) has classified ten subantarctic plant communities of which eight, all present near Grytviken, show no sign of having been modified by reindeer (Leader-Williams 1988:93).

These communities, with their characteristic components, are as follows:

- 1). Tussock grassland: The tussock grasslands are found in coastal lowlands and are dominated by Parodiochloa flabellata. The grass may grow up to 2 m in height on wet raised beaches but less tall in drier areas. The tussocks provide a major habitat at various seasons for seals and penguins as well as birds, rats, and mice year-round.
- 2). Mesic Meadow: The dominant grasses are the short, relatively broad soft-leaved mesophytic grasses Agrostis magellanica, Deschampsia antarctica which occur on moist flats, valley floors and gentle slopes and often have associated herbs and bryophytes.
- 3). Mossbank: Chorisodontium aciphyllum and Polytrichum alpestre are the predominant mosses and occur with microlichens.
- 4). Dry meadow: Referred to sometimes as a short tussock grassland, these areas are dominated by Festuca contracta, a xerophytic grass, and the burnet Acaena magellanica. Forbs, mosses and lichens are also present.
- 5). Dwarf-shrub sward or herbfield: This community, found on stable slopes or stream terraces, may have nearly complete cover by A. magellanica with a dense understorey of the moss Tortula robusta.
- 6). Oligotrophic mire: Formed largely by surface drainage and a high water table, this community is dominated by the rush Rostkovia

magellanica and by bryophytes.

7). Eutrophic mire: This community is dominated by the rushes Juncus scheuchzerioides and R. magellanica and by the moss T. robusta.

8). Fellfield or feldmark: These communities occur on dry, windswept rocky soils and are dominated by the grass Phleum alpinum and turf-forming mosses and lichens.

The marine plant community around the rocky shores of South Georgia provides a habitat for marine invertebrates and vertebrates which in turn provide food for seabirds. The giant kelps such as Macrocystis pyrifera, Lessonia antarctica, and Durvillea antarctica grow around the rocky shores of the island (Headland, 1984:201).

A further review of South Georgia's plant community and autecological studies can be found in Laws (1978:4).

#### 1.4 Fauna

##### 1.4.1 Invertebrates

South Georgia's free-living invertebrates occupy nearly every habitat, marine, freshwater, and terrestrial, though there is not a great species diversity. About 40 species of insects and 10 crustaceans have been identified, as well as other arthropods, annelids, tardigrades, rotifers, gastrotriches, protozoans, and one species each of mollusc, platyhelminth, and coelenterate. In contrast to the lack of endemic flora, about 33% of these invertebrate species are found only on South Georgia. There is also an invertebrate parasitic fauna, generally associated with birds (Headland, 1984:205). Most of the free-living insects live in the coastal lowlands, some inhabiting the Festuca grassland further



inland, while others are common near and around elephant seal wallows, in penguin colonies, or rotting kelp (Headland, 1984).

Introduced insects, for example the German cockroach Blatella germanica have inhabited whaling stations but these have died out after the stations' closure.

The marine invertebrates, both benthic and planktonic, are not peculiar to South Georgia but tend to be widespread in the Southern Ocean. Krill, Euphausia superba, feed on the plentiful summer phytoplankton that is contained in the water masses surrounding the island. Krill is estimated to account for half of the Southern Ocean's biomass of zooplankton in that area.

#### 1.4.2 Vertebrates

##### 1.4.2 a Fish

Of the some 20,000 species of fishes worldwide only 120 live in the waters south of the Antarctic Convergence (Moss, 1988). Antarctic fish are also not associated solely with South Georgia (the exception being the South Georgia icefish Pseudochaenichthys georgianus) but rather are specific to the Southern Ocean. The abundant stocks surrounding South Georgia, however, have made it an attractive area for the fishing industry. Recent work on the trophic relationship of this community of Antarctic demersal fish has revealed changes possibly due to overexploiting of stocks (McKenna, 1991:643).

##### 1.4.2 b Birds

Birds are one of the most visible features of the South Georgia fauna and a major visitor attraction; some 30 breeding and 27 non-breeding species have been recorded (Headland, 1984:267). Only two of these, the South Georgia pipit (Anthus antarcticus) and

South Georgia pintail (Anas georgica), are endemic to the island. The remaining birds are all found elsewhere south of the Antarctic Convergence. Of the breeding species, five feed on the island or around the tidal margins and the remaining 25 are marine feeders. The different members of these communities, their nesting and feeding behavior, are discussed below.

#### 1.4.2 c Inland and inshore feeders

The endemic South Georgia pipit (Anthus antarcticus) lives on a diet of spiders and insects in the summer and scavenges tidal debris in the winter. It breeds on Bird Island and its population is estimated at 150-200 pairs (ibid:212).

Two of these five inland feeders are ducks; the South Georgia pintail (Anas georgica) feeding primarily on algae in ponds and sheltered bays and the speckled teal (Anas flavirostris) which prefers aquatic invertebrates from glacial ponds and lakes (ibid.). The latter has been found breeding only in the Cumberland Bay area (ibid.).

The brown skua (Catharacta lonnbergi) breeds widely around the island in different habitats including areas of open scree, tussock grass (P. flabellata), and sites near colonies of prey (Osborne, 1985). Population estimates by Osborne (1985:57) of the whole island suggest numbers approaching 500 pairs. Sheathbills (Chionis alba) also live near colonies of seals and penguins on which they scavenge, though they also feed in and above the intertidal zone near their source of food (Headland, 1984:212).

#### 1.4.2 d Marine feeders:rocky cliffs

Birds found on the cliffs include the light-mantled sooty

albatross (Phoebetria palpebrata), which lives alone or in small groups and feeds on a varied diet of krill and other crustaceans, fish, squid and carrion. The total population is about 10,000 (Headland, 1984:216).

There are approximately 60,000 pairs each of the closely related black-browed and grey-headed albatrosses (Diomedea melanophrys and D. chrysostoma). Both live in colonies, sometimes together, in the north-west of the island. They do exploit different food sources, however, the black-browed feeding mainly on krill while the grey-headed albatross take squid, lamprey and other fish (ibid:217).

#### 1.4.2 e Marine feeders: tussock and shore habitats

On the raised beaches and lowlands of South Georgia nest the Dominican gull (Larus dominicanus), blue-eyed shag (Phalacrocorax atriceps), and the Antarctic tern (Sterna vittata), utilizing the coastal food resources (ibid:212). The tussock grasses provide habitats in which both the blue petrel (Halobaena caerulea), and dove prion (Pachyptila desolata), can burrow. They coexist by engaging in different breeding times and feeding strategies. The blue petrel consumes 86% euphausiids and 14% copepods, mysids, decapods, and amphipods and feeds further from the breeding colony while the dove prion takes only 59% euphausiids and 37% copepods and feeds closer to the colony (Laws, 1978:9).

The South Georgia diving petrel (Pelecanoides georgicus) nests in burrows on high scree slopes and feeds closer inshore (Headland, 1984). The common diving petrel (P. urinatrix), numerous on Bird Island, nests in rat-free tussock slopes and feeds in the ocean. Feeding strategies of these species are also complementary;

the South Georgia diving petrel chiefly consumes krill while the other takes copepods (ibid.).

The northern giant petrel (Macronectes halli) and the southern giant petrel (M. giganteus) are the vultures of the Antarctic, taking both live food and carrion. They nest mainly among tussock grasses; M. halli populates the north-west of the island and M. giganteus, is found throughout the island (Headland, 1984:216).

A number of colonies of king penguins (Aptenodytes patagonicus) are known, from the 1980s, totalling about 57,000 adults and chicks (ibid:215). Very substantial increases may have occurred since then at some colonies (Stonehouse, 1992, personal communication).

It is estimated that approximately one-third of the world population of gentoo penguins (Pygoscelis papua) breed at South Georgia -- about 90,000 pairs. Of these between 3000 and 5000 pairs breed annually on Bird Island (Williams and Rothery, 1990:1043). Their diet also consists of krill and fish.

South Georgia is probably the most important island breeding site for the macaroni penguin (Eudyptes chrysolophus); the population is estimated at about 5,400,000 pairs, of which, 70,000 breed on Bird Island (Williams and Croxall, 1991:190). These penguins are almost exclusively krill feeders and forage well out to sea.

Chinstrap (P. antarctica) and rockhopper (E. chrysocome) penguins are significantly fewer in number, the former being at the northernmost limit of their range and the latter at their southernmost limit (Headland, 1984:216).

The largest community of the wandering albatross (Diomedea

exulans) is on Bird Island. Their total population on South Georgia is roughly 8,600 birds. Their diet also consists of squid and fish which they obtain while skimming the surface of the ocean (ibid.).

Wilson's storm petrel (Oceanites oceanicus) is a common breeder nesting mainly on scree and in rock crevices, though small numbers are also seen in burrows in moss banks, these petrels feed on zooplankton. In a detailed study of the species at Bird Island, Copestake and Croxall (1985) estimated some 2300 breeding pairs in their research area, a small fraction of the total island population.

#### 1.4.2 f Temporary and occasional avian visitors

The storms and prevailing winds in the Southern Ocean bring other birds from South America and the Falkland Islands. Most would normally not be expected to survive for more than a few weeks or months.

The fate of introduced birds has been much the same, dying out when they could no longer benefit from human habitation.

#### 1.4.2 g Mammals: indigenous

Mammals indigenous to South Georgia are found exclusively in the marine environment, these include two orders of whales and two of seals.

The two species of seal which occur in great numbers on the island's beaches are the Antarctic fur seal (Arctocephalus gazella) (c.1,500,000) and the southern elephant seal (Mirounga leonina) (c. 360,000) (Bonner, 1992, personal communication)(McCann and Rothery, 1988:309).

Both seals, when not breeding, are pelagic feeders. Fur seals feed on krill and occasionally, fish, squid, and birds while

elephant seal dine mainly on squid with some fish. (Headland, 1984:224).

Leopard seals (Hydrurga leptonyx), a solitary species which feeds on fish, krill, birds, and seal pups, occur less commonly in and around the waters of South Georgia. Weddell seals (Leptonychotes weddellii) are seen occasionally off the southern end of the island; there is a small breeding colony at Larsen Harbour. Two rare visitors are the crabeater seal (Lobodon carcinophagus), found mainly in the ice-pack south of South Georgia, and the subantarctic fur seal (Arctocephalus tropicalis) an occasional visitor probably from Gough Island, its nearest breeding site (Headland, 1984:221).

Unlike the seals, many of which give birth to their pups on the beaches, the whales inhabiting the waters of South Georgia have little impact on it except for their krill consumption.

#### 1.4.2 h Mammals: introduced

There are three mammals whose introduction has effected the flora on South Georgia, the brown rat (Rattus norvegicus), the reindeer (Rangifer tarandus), and to a lesser and more local extent, the house mouse (Mus musculus) (Headland, 1984:231).

Their impacts are discussed in Chapter 3. Other mammals have been introduced including, cats, sheep, cattle, pigs, goats, ponies, horses, rabbits, dogs, and a variety of pets but these have not survived for long due to the climate or the closing of whaling stations and consequently have had very little permanent impact.

### 1.5 Management implications and needs

The detailed information available on South Georgia's flora and fauna is crucial for two reasons: first, good conservation plans are based on specific, scientific information for the setting of goals and objectives and second, armed with such information, planners can identify sites where there is a potential for competing use (for example tourists and scientists visiting the same colonies of birds) and design strategies to avert problems. Also with the knowledge of communities and their interrelationships an ecosystem approach can be applied to the island and conservation directives maintained.

In the next chapter, the historic and modern conservation strategies of South Georgia are examined and in particular the current plan analyzed for its adequacy in environmental management.

## CHAPTER 2

### THE DEVELOPMENT OF ADMINISTRATION AND MANAGEMENT OF SOUTH GEORGIA

Despite Cook's failure to find a great southern continent, his discovery of South Georgia brought positive commercial benefits. Although his account was unenthusiastic and saw no particular use for the island, his comments on the wealth of seals to be found there provided sealers with information on new southern hemisphere seal stocks that could be harvested. It is with the exploitation of fur seals that the development of South Georgia's regulations begins.

#### 2.1 Sealing: the early years 1775-1908

The following history of sealing on South Georgia is derived from Dickinson's (1987) account of sealing in the Falkland Islands and the Dependencies.

Following the publication of Cook's journals, the start of this industry was delayed by the American War of Independence 1775-83, which occupied both men and ships. British vessels arrived first in 1786-87 and harvested fur seal skins to sell in Britain and China and elephant seal oil for domestic use. The American fleet arrived later in 1792-93, with crews harvesting fur seal skins for sale in China.

Sealing activities from 1786 to 1825 were intense, with an estimated 20,000 tons of oil (extracted from some 62,000 elephant



seals). Although records are incomplete, they indicate that from March 1793, November 1800 to February 1801, and October 1801 to February 1802, approximately 200,000 fur seals may have been taken at South Georgia.

This early wholesale slaughter of animals, without any regulation, was recognized by some individual sealers as threatening the livelihood of the industry. The animals simply would be reduced to uneconomic numbers. One such individual was John Leard, Master of the Royal Navy, who wrote in 1788 to Lord Hawkesbury, President of the Council for Trade and Foreign Plantations, that a "very extensive and Valuable Seal Fishery may be carried on ... provided the Fisherys are Conducted by proper Persons that will take care not to kill the Females when with Young..." (Leard, 1788). His warning went unheeded and no regulatory action was taken for the next 100 years.

From just after 1800 until the 1820s, there was a lull in the industry due to depleted stocks of both fur and elephant seals as well as the reduction in maritime trade during the American and European wars. However by the 1820-21 season, 91 vessels had been back sealing in Antarctic waters. James Weddell estimated that since 1786 some 1.2 million fur seals had been taken for their skins (Bonner, 1976). Weddell too advocated that the fur seal might have been saved by "a law similar to that which restrains fishermen in the size of the mesh of their net" (Bonner, 1976).

Elephant seal hunting was more common after 1815 when their oil was in demand to supply the growing industrial development in the United States. But again, without a governmental body to create conservation measures, sealing crews were left to exploit the

stocks until they were virtually non-existent.

From the 1820s to the 1860s, further fur sealing was sporadic, essentially answering the whim of the European fashion market and its demand for seal skin coats. The call for oil grew as well. The exact number of seals taken from South Georgia in this period is unknown, but from 1875 to 1921 at least 87,255 skins and 3,100 barrels of oil had been recovered.

Not until 1881 was Southern Ocean sealing first controlled by ordinance. The Seal Fishery Ordinance applied only to the Falkland Islands not to South Georgia. The Dependencies of the Falkland Islands, including South Georgia, were brought into legal jurisdiction by an ordinance in 1908 (Falkland Islands, 1908a) (Dickinson, 1987).

In short, not until after the bulk of exploitation had occurred, and 120 years after Leard's warning, did the first legislation appear to control sealing on South Georgia.

The sealing industry, particularly the fur seal, had declined to critical levels by the time of the International Polar Year Expedition 1882-83. The population of fur seals was so devastated that despite regular inspections of the coast beginning in 1910, none was seen until 1915 when one juvenile male was shot and killed. Five fur seals were reported on Bird Island in 1919 (Bonner, 1964).

## 2.2 Regulations for economic development 1908-1959

Several changes occurred after 1900 that resulted in the creation of numerous ordinances, regulations, and licensing

procedures. In 1904, South Georgia gained its first permanent human population, at Grytviken, the first whaling station to be established on the island. Sealing had required only small ships and temporary shore gangs to harvest a vast number of seals. The crews prepared oil or skins in a relatively short time and then moved on either to find new sources or to return home. Whaling in the early 20th century required shore based factories and permanent installations with a substantial summer population living and working close to the hunting grounds. The pressure on the island of a highly regulated profitable industry generated the need for regulatory administration and economic control.

Among the early administrative policies developed specifically for South Georgia (whaling was generally covered by an ordinance in 1908 that made it unlawful to hunt or kill in "Colonial Waters" without a licence (Falkland Island, 1908b)), there followed ordinances to control the hunting of penguins (for their oil) and elephant seals: these were the Ordinance for the Preservation of Penguins in the Dependencies 1909 and the Ordinance to Regulate the Seal Fishery in the Dependencies, 1909 (Falkland Islands, 1909a&b). Both required persons to be licensed before they could take or kill penguins or engage in sealing. The latter included both the fur and elephant seals. These ordinances provided for a licensing system which granted the Governor a rapid means to regulate the industry at his discretion. One such licence was granted in 1911 to take 2000 jack-ass penguins at West Falklands (Falkland Island, 1911a).

Modern sealing legislation on South Georgia (1909-1964) may be said to have developed as a comparatively successful attempt to

conserve a species - the elephant seal - as an economic resource. Two pivotal conservation measures were introduced: one in 1910 which set quotas and issued licences for the hunting of male elephant seals (McCann and Rothery, 1988). The other, in 1911, divided the coast of South Georgia into three sealing areas, for the purpose of granting licences "to take seals in the Dependencies, on such conditions in respect of territorial and marine limits as may be approved by the Governor" (Falkland Islands, 1911b). These divisions were worked in rotation to allow a breeding period for the seals. Though the species of seal was not specified, the industry was developed by whalers and based almost exclusively on oil, which was sold along with whale oil.

The 1912 "Ordinance to provide for the preservation of certain wild animals and birds in South Georgia" instituted a schedule system covering birds and mammals. Schedule I forbade the killing of those animals and birds on it including reindeer, which had originally been introduced to provide food for the whalers (Falkland Islands, 1912). The administration clearly recognized the value in preserving an economic resource in order to maintain it for future purposes.

A second list, Schedule II, later allowed for the taking or killing of wild animals and birds only during specific seasons. The addition or deletion of various species of birds and animals occurred as revisions to the above ordinance but notably in 1915, the Governor was "pleased to declare that each and all of the varieties of penguins found in the territorial waters of the Colony and its Dependencies are hereby added to Schedule I of the Ordinance" (Falkland Islands, 1915a).

What happened to whaling regulation? By 1913, seven whaling stations were operating around South Georgia (Headland, 1984), regulated only by the 1908 Whale Fisheries Ordinance which made it unlawful to hunt or kill whales in "Colonial Waters" except under licence. The preservation and protection of whales around the island came under regulation in 1913, by the government of the Colony of the Falkland Islands and Dependencies, which issued separate regulations for South Georgia, forbidding "leaseholders from killing or shooting any whale calf or any female whale accompanied by her calf" (Falkland Islands, 1913a).

The juxtaposition of this ordinance and the 1912 ordinance to protect reindeer makes an interesting contrast. It also marks the departure from the more general restrictions of licensing for the economic protection of an industry to the economic preservation of an industry. A kind of guideline titled, Supplementary Memorandum for the information and guidance of persons engaged in the whaling, sealing, or fishing industry in the territorial waters of the Falkland Islands and its Dependencies, was published later the same year (Falkland Islands, 1913b).

Several measures were initiated out of patriotic or economic necessity in response to World War I.

The first was with Regard to the Export of Whale Oil, 1915, which controlled the exportation and importation of whale oil by enemy countries. Later that year, it was amended again to allow the Governor to cancel leases and licensing for whaling by enemy countries (Falkland Islands, 1915b).

Two more, the Sealing Emergency Regulations and the Whaling Emergency Regulations of 1916 responded to the need to extend the

season for taking elephant seals to procure more oil and, in the case of whaling, to authorize the Governor to "depart from any or all provisions of the Whale Fisheries Ordinance of 1908" during the war (Falkland Islands, 1916 a&b).

After the war, the bulk of the ordinances focused on regulating the whaling, sealing, and fisheries industries rather than conserving wildlife. Some of the latter included a 1921 proclamation to suspend "the issue of licenses to kill or capture the fur seal" (Falkland Islands, 1921). But as has been noted, by 1919 only five fur seals had been seen on Bird Island. The laws regulating the seal fishery ("Seal" meant "fur seal, the hair seal, the sea otter, the sea elephant, the sea leopard, the sea bear, the sea lion, the sea dog and any animal of the seal kind") were amended and consolidated in 1922. One noteworthy addition to this ordinance was the creation of a Fisheries Officer whose duty it was to enforce the regulations including going aboard ship and examining relevant documents to ensure that the vessel was operating legally (Falkland Islands, 1922).

The regulatory measures taken after this time were essentially industry driven. The movement toward the conservation of wildlife, evidenced by the 1912 ordinance For the preservation of certain wild animals and birds, was sustained by various consolidations and amendments, but generally the ordinances and regulations were created to protect the sealing and whaling industries.

Elephant seal stocks fared well under regulations that protected the government's economic interest in the industry. Legislation to sustain whaling stocks was less effective, though whaling continued from three stations on South Georgia until the

1960s. With the demise of whaling, sealing became uneconomical and both industries finally closed in 1965 (Dickinson, 1987).

### 2.3 Changing Focus: conservation 1959-Present

A change of focus in environmental conservation on South Georgia came about as a result of negotiations for the Antarctic Treaty which was signed in 1959. Dr Brian Roberts, a biologist and geographer who, as a member of the British Grahamland Expedition 1934-37, had spent time on South Georgia at the height of the whaling industry, was one of the architects of the Treaty. Several experiences, such as the extremely slow recovery of fur seals, the economic devastation of the whaling industry and reduction in stocks (created by the development of the stern slipway whaling ship) and consequent lack of effective government control, and the necessity of establishing preservation controls before the economic explosion of an industry took place, led him to formulate conservation goals for both the Treaty area and South Georgia (Heap, 1991). An important outgrowth of these experiences was a provision for the conservation of wildlife which was adopted in 1964 and became known as the Agreed Measures for the Conservation of Antarctic Fauna and Flora.

This mini-treaty (Heap, 1991) set out to protect the native flora and fauna in the Treaty area (south of 60° S) and urged signatories to minimize interference with these populations. Special sites were set aside to preserve and protect areas of special concern.

Since the provisions of the Agreed Measures applied only to

the land and the floating ice-shelves, it left the whales and seals at risk. A set of regulations pertaining to the protection of whales had existed since 1946, when the current International Convention for the Regulation of Whaling was signed, giving the International Whaling Commission (IWC) the responsibility of regulating the whaling industry (Bonner, 1987). These regulations were quotas set in 'Blue Whale Units (BWU)' designed to protect the larger whales but which allowed them to be taken and encouraged the depletion of the smaller ones as well (Laws, 1989). So there existed a set of regulations aimed at the protection of whales, but no equivalent legislation for pelagic seals. This gap was recognized by the Treaty powers as a threat to the vast stocks of seals when, in 1964, a pilot Norwegian sealing expedition visited the Antarctic. After discussion extending from 1964 to 1972, the Treaty powers agreed to the Convention for the Conservation of Antarctic Seals which finally provided a more complete measure of conservation for seals, including an outright ban on the hunting of both the fur seal and the southern elephant seal south of 60° S latitude and required reporting statistics of scientific sealing in areas north of 60° South (Heap, 1990). Seals are protected in that they can "not be killed or captured within the Convention area by Treaty nationals or vessels under their respective flags ... (Heap, 1990)." This did not then cover seals on land at South Georgia.

Between 1964 and 1972, when the CCAS was adopted, conservation measures were adopted for the Falkland Islands that reflected a change in focus from preservation for economic reasons toward conservation for scientific reasons and for conservation's own sake. In June 1964, the Nature Reserves Ordinance, 1964 defined



"nature reserves" as land "reserved for the purpose of protecting, and of providing, under suitable conditions and control, special opportunities for the study of, and research into, matters relating to the flora and fauna of the Colony" (Falkland Islands, 1964). This ordinance did not apply to South Georgia. Later that year, the Wild Animals and Birds Protection Ordinances 1964 were amended for the Falkland Islands presumably to bring it in line with the concept of nature reserves.

Later that year, this ordinance was applied to South Georgia and Schedule 1 changed to read "Wild animals and birds which may be killed at any time -- South Georgia Shag" (Colony, 1969a). Instead of a schedule protecting a few named species from destruction, the new schedule offered full protection to most and listed only a few species allowed to be taken.

Finally, there were two major legislative reorganizations which paved the way for the consolidated and amended conservation regulations for the Dependencies. First, in 1969, the conservation laws for the Dependencies evolved into the Application of Colony Laws (No. 2) Ordinance. This enlarged the Wild Animals and Birds Protection Ordinance 1964 to apply to the Dependencies (Colony, 1969b). These were consolidated into the Falkland Islands Dependencies Conservation Ordinance 1975 (1975 Ordinance) bringing together prior legislation and adding new protective orders.

#### 2.4 Falkland Islands Dependencies Conservation Ordinance 1975

This most recent ordinance, the most important legislation currently covering South Georgia, is derived partly from the Agreed

Measures component of the Antarctic Treaty System. Roberts' outlined the four main areas of South Georgia's new ordinance to which attention should be drawn: 1) that the killing and exploitation of wildlife in the island and its territorial waters should be subject to permit; 2) that Specially Protected Areas should be established to preserve the ecological systems of the island, with the aim of keeping everyone out unless for compelling scientific reasons; 3) that Sites of Special Scientific Interest be designated to prevent scientific investigations from being jeopardized by disturbance, except by permit issued for compelling scientific reasons; and 4) that Areas of Special Tourist Interest be established which are representative of wildlife and scenic beauty where tourist activity can be systematically assessed [my emphasis] (Roberts, 1977:101).

This new ordinance was more than simply a consolidation of numerous orders; it signalled an evolution in philosophy. Licensing became a means for controlling the taking or killing of animals for scientific reasons not economic ones. Preservation of animals was based more on welfare of stocks than on exigencies of industry requirements. Finally, a role for tourists was recognized, a recommendation made for monitoring their effects on South Georgia's ecosystems.

### 2.5 Other conservation measures

During the 1970s, krill fishing was seen as the next great threat to the Antarctic marine ecosystem. The Antarctic Treaty developed an ambitious plan, the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR), which was designed to

protect the Antarctic marine living resources south of 60°S latitude and the area between that latitude and the Antarctic Convergence (which would include South Georgia most of the time (Heap, 1990)). An important component of CCAMLR was the idea of managing the Antarctic marine living community by setting catch limits, designating protected species, and determining open and closed seasons for harvesting. CCAMLR operates through a Commission whose task it is to find a method to assess the effects of harvesting on the populations. While the Commission has yet to find a reliable method of doing this, CCAMLR did set up an initial framework to control Southern Ocean fisheries (Bonner, 1987).

The most recent regulation covering South Georgia's fisheries is The Fisheries (Transshipment and Export) Regulations 1990 which forbids, without a licence, any transshipment of any fish (defined broadly to include any marine mammal or bird in any form living or dead) within South Georgia and the South Sandwich Islands waters and territorial seas, or transport from those waters any fish which has been transshipped. The Commissioner may appoint a fisheries protection officer (Section 2, S.R. & O. No. 1 of 1990). In 1990 a Harbour Master was appointed to South Georgia and became its first fisheries protection officer (Headland, personal communication, 1992).

## 2.6 Current administration and management

Not until 1908 (and after the period of heavy exploitation) was South Georgia specified and consolidated as a Dependency of the Falkland Islands and recognized as a territory in the Antarctic

region. The Governor of the Colony of the Falkland Islands was, for administrative convenience, appointed to be Governor of the Dependencies (a sector of Antarctica, South Orkney Islands, South Shetland Islands, South Sandwich Islands) as well. These titles were separate and were not meant to imply a title derived from that of the Falkland Islands.

The Falkland Islands Dependencies were redefined in 1917, by specific coordinates of latitude and longitude and included all of the territories within its boundaries. The Governor still retained his dual appointment to both.

This status was maintained until 1962, when following Britain's accession to the Antarctic Treaty, The Falkland Islands Dependencies were divided: British Antarctic Territory was separately designated as an area between 20° W longitude and 80° W longitude and South of 60° S latitude, while South Georgia and the South Sandwich Islands remained dependencies of the Falkland Islands. A consequence of this was that the Governor of the Falkland Islands, who was also the Governor of the Falkland Islands Dependencies, became also High Commissioner for British Antarctic Territory. After the Argentine invasion of South Georgia and the Falkland Islands in 1982, the office of Governor of the Falkland Islands and Dependencies was suspended. A Civil Commissioner and a Military Commissioner were appointed until 1985, when a new South Georgia and South Sandwich Islands Order abolished the designation Falkland Islands Dependencies: South Georgia and the South Sandwich are currently administered from London with a Commissioner in Stanley. The Magistrate is empowered by a Commissioner, who resides at the traditional site of government, King Edward Point. A

military garrison also resides there (Headland, in press).

### 2.7 Administration of the 1975 Ordinance

Unlike the beginning of the sealing and whaling industry which went unregulated, in large part due to the lack of government, South Georgia is now administered through from Stanley through London and locally by a resident magistrate. The administration enforces the 1975 Ordinance, with powers to develop and enforce measures it finds appropriate to protect its interests.

The 1975 Ordinance draws from the Agreed Measures of the Antarctic Treaty provisions for the protection of wildlife on land and in South Georgia's territorial waters, the establishment of areas for conservation and study by scientists, and the designation of areas for visits by tourists.

It is the only instrument currently regulating the conservation of resources, wildlife, and amenity. How then is this accomplished?

The text of the Ordinance is brief and can be found in its entirety in Appendix A. It details the responsibilities of the Commissioner (or that of his delegate) which are threefold:

First, the Commissioner can issue a permit granting formal permission in writing to conduct such activities as are otherwise contravened by the Ordinance, namely:

- (a) kill, wound, capture, molest or export any native mammal or native bird; or
- (b) collect or destroy any native plant; or
- (c) enter any Specially Protected Area or Site of Special

Scientific Interest; or

- (d) bring into the Falkland Islands Dependencies any living animal, plant, virus, bacteria, yeast or fungus of species which are not indigenous to the region; or
- (e) visit or travel on land in any part of the Falkland Islands Dependencies, as a tourist or for any other purpose of recreation, other than in an area for the time being designated under section 14 as an area of Special Tourist Interest (Section 3).

The Commissioner becomes the administrative protector of the flora and fauna but may issue a licence to regulate that protection. He may do so for the following reasons:

- (a) to provide indispensable food for local use in limited quantities, and in conformity with the purposes and principles of this Ordinance;
- (b) to provide specimens for scientific study or scientific information;
- (c) to provide specimens for museums, zoological gardens, or for other educational or cultural institutions or uses;
- (d) to provide for regulating the management and use of living resources (Section 6, subsection 2).

In connection with this section any one in whom the power to issue permits is placed shall send the Commissioner a report at year end (Section 10).

Second, the Commissioner or his delegate can designate, by Order, additional areas as a Specially Protected Area (Section 12, subsection 2), a site of Special Scientific Interest (Section 13, subsection 2), and an Area of Special Tourist Interest (Section 14, subsection 2). Subsection 3 of Section 14 (Areas of Special Tourist Interest), states that the "Governor shall have regard to the need to monitor the effects of tourists on the natural ecological systems within these areas "[my emphasis].

Finally, the Commissioner may make regulations to carry out provisions of this Ordinance (Section 19).

The 1975 Ordinance generally consolidates previous regulations; it protects wildlife and allows the Commissioner to regulate its use and management, it establishes and preserves natural areas on the island, and allows for special tourist areas. Like most other legislation it offers few objectives, goals, or guidelines: it is not a prescription for management. Two questions need to be answered: Is the 1975 Ordinance an adequate basis for managing South Georgia? If not what additional measures or instruments are needed to encourage sound management practices?

While South Georgia was a remote outpost, visited only by well-organized scientific parties with clear objectives, there was little need to consider its resource vulnerability: it did not need management. However, South Georgia is no longer remote: in common with other periantarctic islands of the Southern Ocean, it is subject to new pressures for which management programs are required.

#### 2.8 Is the 1975 Ordinance adequate?

The Agreed Measures were adopted in 1964, and eleven years

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later were used as the basis for the 1975 Ordinance covering South Georgia. However, questions raised in the interim suggested that the Agreed Measures were barely adequate in protecting the flora and fauna of the Antarctic region.

In 1971, during the Colloquium on Conservation Problems in Antarctica held in Blacksburg, Virginia (US), ad hoc work groups evaluated the existing Agreed Measures in relation to Antarctica. They made three recommendations: first, that these measures should be updated to refer to ecosystems, second, that a conservation officer with enforcement powers be appointed for every Antarctic station, and third, that little attention was being paid to a provision of the Treaty that visits be reported to contracting nations and include those by tourists (Parker, 1972).

The 1975 Ordinance is not intended as a management programme, and does not provide guidelines on management. Section 6, subsection 2(d) allows the Commissioner to regulate "the management and use of living resources", but no standard is set for desired management objectives and no methods of achieving objectives. It does not call for any measures to be taken should ecological imbalances appear nor are methods of detecting an imbalance recommended. The Commissioner can make regulations as necessary, but without overall management objectives and goals for the ecosystems, this is likely to provide a piecemeal approach.

No conservation officer has been appointed to oversee or coordinate policies on the island. Currently there are no on-site observers specifically for the monitoring of tourism or enforcement of regulations laid down by the ordinance (Chapter 4 discusses this in more detail).

Later comments by Bonner and Angel (1987) on the Agreed Measures suggested that they be strengthened to include an ecosystem approach, a new category of protected areas to encompass land forms and abiotic features (not just areas of scientific interest) and general provisions to protect biota in addition to birds and mammals. They particularly recommended amending Article VII, concerning harmful interference. The Agreed Measures form only the basis of the South Georgia legislation and perhaps not surprisingly, none of these suggestions has been incorporated.

More recently, the ATS has continued to debate the question of environmental protection and management (especially with respect to tourism) and, after months of discussion, the Protocol on Environmental Protection to the Antarctic Treaty has been drafted. This was intended to fill the gap between the intent of the Treaty and the need to provide a method of environmental protection.

Environmental monitoring has been recognized as a missing but necessary component of conservation strategy. The evolution of conservation in the Antarctic Treaty System has shown up the weakness in a policy without a management strategy to implement it. In an article published before a formal policy was defined, Heap (1987), concluded that the future of Antarctica depended upon two developments: the formulation of a conservation strategy and the application of those strategies to environmental assessment and management. Abbott and Benninghoff (1990:394) made much the same conclusion, "Effective conservation of the Antarctic will require development and implementation of an environmental monitoring program." A shift from simple legislative control toward the development of management strategies has recently been seen in the

management of several southern islands, especially those in the New Zealand and Australian sectors. Some form of management plan is surely required for South Georgia, especially in view of the increasing numbers of tourists each year, and the steady influx of scientists eager to study its remarkable flora and fauna.

### 2.9 Summary

Much of the early legislation covering use of South Georgia's economic resources was introduced by successive administrations in response to industrial developments which, if properly controlled, offered possibilities of long-term revenues. The principal tools used to achieve their economic goals were licensing, zoning, and schedules. These measures were seldom pro-active and often fell short of good management.

Four stages of conservation legislation can be defined: 1) measures to control the activities of a permanent population at Grytviken for the whaling industry, 2) measures for the management of elephant seal stocks for economic purposes, 3) increasing attention to preservation of species through the 1912 Ordinance to provide for the preservation of certain wild animals and birds and, 4) the Agreed Measures of the Antarctic Treaty on which was based the 1975 Ordinance.

### CHAPTER 3

#### FUR SEALS, REINDEER AND OTHER MANAGEMENT PROBLEMS

Wildlife conservation seeks to manage ecosystems for the purposes of maintaining natural complexes of plants and animals, from which to derive scientific knowledge, enjoyment, or potential for future development. It does not attempt to alter the natural situation (Holdgate, 1970). However, it requires a "conscious policy for the ecosystem" which "may involve active management: conservation is in this sense an applied science" (*ibid.*).

The exploitation of seals and whales during the 18th, 19th, and 20th centuries brought substantial changes to the ecosystems on South Georgia. The lack of any regulation prior to 1908, and the lack of a "comprehensive policy" throughout most of the period from 1908 to 1975, is evidenced by the near extinction of the fur seal, the devastation of whale populations, and the many introductions of alien plants and animals to the island.

One stated aim of the 1975 Ordinance was the protection of wildlife. While 'protection', in the sense of maintaining a status quo, may be derived by ordinance in a static situation, environments that are subject to substantial and varying impacts are more likely to require the active management envisioned by Holdgate. Conspicuously lacking from the 1975 Ordinance is the element of feedback an effective management plan requires. To investigate how the Ordinance addresses imbalances in ecological systems, perturbations represented by the recovery of fur seals, the spread of introduced reindeer, and the repercussions each have

had on the island's flora and fauna.

### 3.1 Seals: a recovery

From the long-term overexploitation of these species of seals, the populations have made dramatic recoveries. Monitoring of this recovery began first in 1933 when search parties on Bird Island found only individuals or small groups of fur seals. A 1936 search team reported 59 fur seals, including 12 pups (Bonner, 1976). In 1956, a more systematic approach to census taking was conducted and identified well-established breeding colonies. At that time, the total island population was estimated at between 8,000 and 12,000 animals, excluding pups (*ibid.*) Regular observations since then have revealed a dramatic increase of fur seals on Bird Island.

Fur seals have continued to undergo a rapid explosion in their population. By summer 1975/76 the number of pups was estimated at 90,000, corresponding to a total island population of approximately 300,000 seals (*ibid.*).

This increase in population is likely due to the increased availability of krill as a result of the reduction in the numbers of baleen whales generally in the Antarctic, and more specifically, around South Georgia (Bonner, 1976).

The population of elephant seals at South Georgia has been recently reassessed at approximately 360,000 excluding pups (McCann and Rothery, 1988:309). This indicates a population of approximately the same size as in 1951, although it has fluctuated, both naturally and due to hunting since then.

These authors (*ibid.*) have concluded that the "cessation of sealing operations at South Georgia had had little effect on the

size of the female population," though the sex ratio changed both during the hunting period, when only males were taken, and subsequently South Georgia's elephant seal population is the only of the four major populations (Kerguelen, Heard, Macquarie, and South Georgia) that is not currently in decline, for reasons not at present clear. One recent threat to fur seals is their entanglement in man-made debris (Croxall et al, 1990a). A study at Bird Island revealed that if South Georgia's population is representative of the Antarctic, based on a total population of 1.2 million fur seals, approximately 5,000-10,000 animals become entangled every year (Croxall, 1990a). While this number of animals entangled does not affect the growing population, it indicates the increasing amount of material jettisoned into the sea and a need for tighter management procedures to reduce it.

### 3.2 Seals: impacts on flora and fauna

Having once been the impacted species, the explosion in the seal population since the 1960's (approximately 17% per annum), has resulted in their impacting terrestrial environments and populations of other fauna (Bonner, 1985).

The increasing numbers of fur seals which now breed on South Georgia, particularly Bird Island (breeding ground of some 150,000), is creating major disruptions to lowland vegetation. The seals, which come ashore to breed from November to April, are hauling out at the period corresponding to the growing season for plants.

Severe damage is being done to Parodiochloa flabellata which

fringes the beach area as well as some higher slopes (tussock grassland), Acaena magellanica (an understory to the grass), Deschampsia antarctica growing around the banks of streams or on raised beaches (mesic meadow or dry meadow); and the fellfield vegetation occupying rocky outcrops: Colobanthus quitensis, Acaena tenera, Phleum alpinum and various liverworts and mosses (Bonner, 1985:643).

The principal damage to these plants occurs from two different groups of seals. First, lactating females wishing to feed their pups, move off the beach to avoid sexually active males and agonistic encounters between males. To do this, they will usually choose a clump of tussock grass to lie on. This damages the tussock and may ultimately kill it. Non-breeding animals unable to secure a place on the beach, move inland over these plants. Except for large males, they too prefer to lie on top of tussock clumps. This harm is far less and has so far not resulted in the death of the plants (ibid:642).

The return to a higher density population of fur seals on South Georgia mainland and Bird Island raises the question of whether seals have merely reestablished the balance of the pre-exploitation conditions. Evidence currently suggests that there are more seals today than there have been in historic times. For example, a raised beach on Bird Island several thousand years old, showed no sign of erosion within the last two or three hundred years but rapidly eroded in the 15 years after 1960. Further, reports by sealers indicated that fur seal densities were lower and that non-breeding animals had access to clear beach areas away from breeding animals (Bonner, 1985).

Seal culling has been suggested (Falkland Islands Economic Study, 1982:78) but thus far no comprehensive management strategies have been set to protect vegetation other than limited enclosures in some areas (Bonner, 1985:645).

Fur seals not only cause harm to the vegetation itself but to the fauna associated with it. Seals lying on and trampling the tussock grass damage the peaty soil beneath it causing burrow-nesting birds like dove prions (Pachyptila desolata), blue petrels (Halobaena caerulea, common diving petrels (Pelecanoides urinatrix) and whitechinned petrels (Procellaria aequinoctialis) to lose their burrows or have them exposed to predation (Bonner, 1985:644).

Also adversely affected by the damage to tussock clumps are the South Georgia pipit (Anthus antarcticus) and the South Georgia pintail (Anas georgica) which utilize the grass as a nesting area and feed on the invertebrates living there (Bonner, 1985).

Aside from damage to plants and plant communities, fur seals kill and occasionally eat penguins, macaroni penguins in particular. Although the penguins do not make up a significant part of their diet, their carcasses do provide an important source of food for northern and southern giant petrels (Macronectes giganteus and Macronectes halli) (Bonner and Hunter, 1982:78).

Wandering albatross (Diomedea exulans) have experienced a 22% decrease in breeding population since 1961 (Croxall et al, 1990b:237). The authors do not ascribe lack of breeding success to fur seals: more likely it reflects the preference of young albatross to select breeding sites where few seals are present.

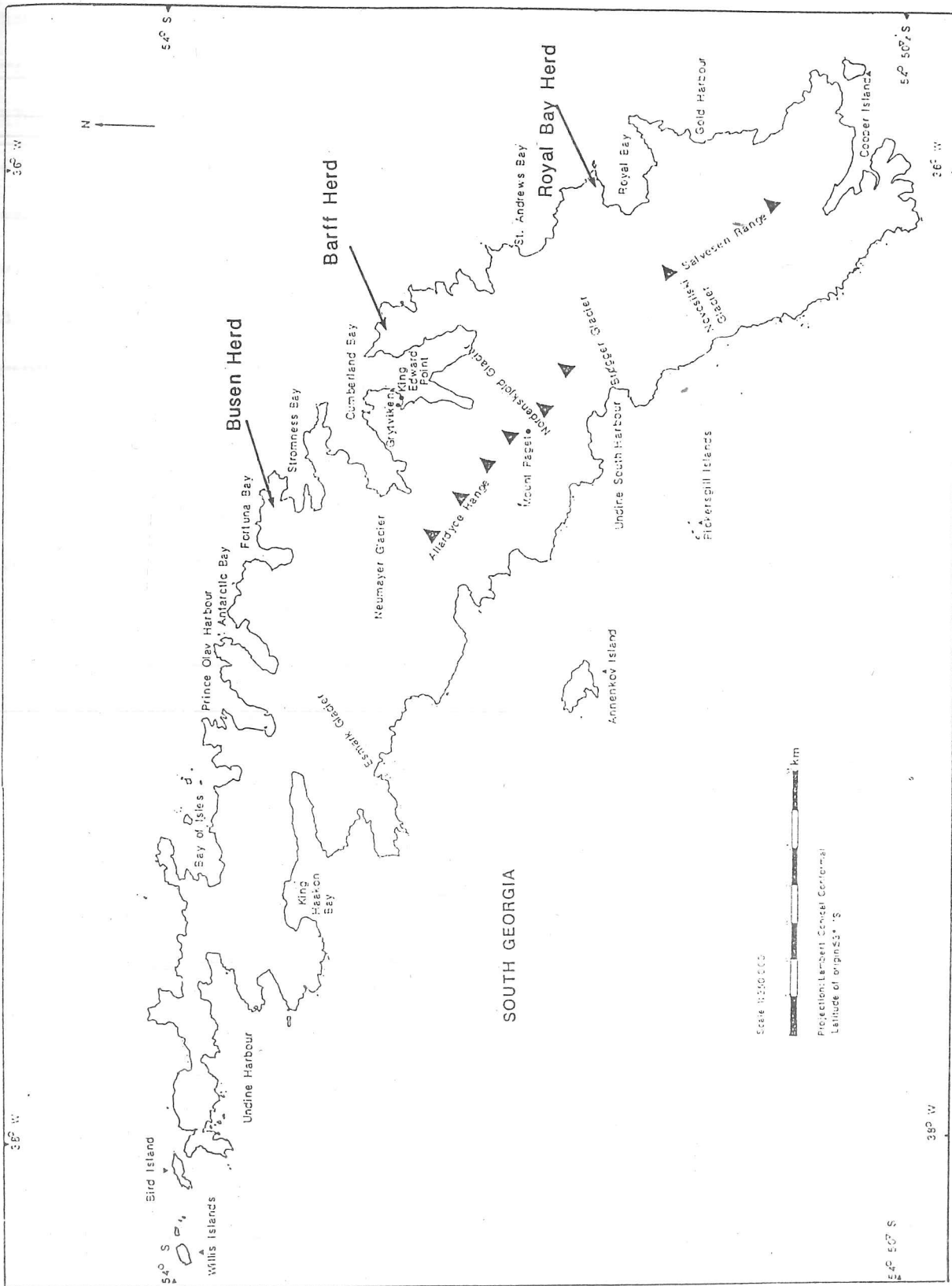


### 3.3 Reindeer: an introduced species

Stocks of reindeer on South Georgia have been studied by Leader-Williams (1988). The following is a brief summary from that study.

Reindeer were introduced on South Georgia on three occasions between 1911 and 1925 to provide whalers with both sport and a source of fresh meat. C.A. Larsen brought 11 reindeer from Norway in 1911 (one died on the ship) and released them in the Barff Peninsula. A second herd was introduced during the same whaling season but all perished in a snow slide. The third herd of 7 reindeer was released into the Husvik Harbour-Stromness Bay area in 1925 and became known as the Busen herd. These two remaining herds have never intermingled nor interbred owing to the glacial barriers between them (see Figure 3.1).

Figure 3.1 Location of reindeer herds



Reindeer were initially protected by legislation in 1912 and included in Schedule 1 of An Ordinance to amend the law with regard to the preservation of wild animals and birds, which prohibited their killing (Falkland Islands, 1912). The first permits were issued to whalers in 1916 to shoot male deer only. From then until the 1930, about 150-200 deer were harvested under licence. As whaling declined in the late 1950s it became too costly to deploy a whale catcher to take men hunting for reindeer. The Barff herd's population increased in the 1950s to about 3000 animals then experienced a sharp decline and a loss in available grazing, with part of the herd spread around the Cook Glacier (1961-65) to form the new Royal Bay Herd. The populations, at the time of the study, were estimated to be 1900 for the Barff herd (including Royal Bay herd) and 800 for the Busen Herd.

At the peak of this irruption, food became a limiting factor and the population crashed. Leader-Williams concluded (1988:258):

"Numbers reached at the peak of the irruption will probably not be attained again since the initially abundant food supply is unlikely to be fully restored in the continued presence of the introduced animal .... Therefore population numbers derived from recent censuses of long-established mammals are unlikely to change dramatically, unless there is outside interference from man (such as the erection of a fence on Campbell Island). If management is attempted at this stage, the goal will be to alter a displaced equilibrium to the advantage of native species and the disadvantage of introduced species."

The herds appear to have stablized and at present no more than 100 reindeer a year are allowed to be taken (Headland, personal communication, 1992).

### 3.4 Reindeer: impacts on vegetation and fauna

A study undertaken in response to British Antarctic Survey (BAS) botanists' concern at the spread of reindeer that had occurred since Bonner's 1958 study, indicated a need for further monitoring and management. While their range is geographically restricted by glaciers (see Figure 3.1), their grazing affected only the local populations of plants. Their main winter forage is tussock grass: in spring as the snow melts, other communities such as the mossbank and dry meadow become available, and in summer mesic meadows, tussock grasslands, and oligotrophic mire communities are preferred to mossbanks and fellfields (Leader-Williams, 1988:101-102).

The results confirmed a condition of overgrazing in the areas occupied by the Barff and Busen herds, causing major changes in the structure and density of plant communities. There are extensive areas of tussock grasslands affected, Parodiochloa flabellata has been greatly reduced on raised beaches and replaced either by mossbanks or the introduced grass Poa annua. Swards of Dechampsia antarctica are gone from mesic meadows and have been replaced by R. magellanica or P. annua.

While certain members of the plant communities are slow to recover from overgrazing, such as the lichens, the native grasses Festuca contracta and Phleum alpinum, the rushes, Rostkovia magellanica and Juncus scheuchzerioides, do not appear to be affected. Leader Williams (1988:241) concludes that on South Georgia "no species of vascular plant is known to have been lost from areas occupied by reindeer for several decades" even though

the community has changed.

The reduction in tussock grassland caused by reindeer also results in the loss of nesting sites for many species of seabirds, including the same burrow-nesting birds as were impacted by seals. Additionally, the disruption of the plants and soil alters the arthropod fauna, like the perimylopod beetle (Hydromedion sparsutum), which is an important decomposer (Leader-Williams, 1988:266).

Leader-Williams (1988:274) acknowledges that, "With the recognition of the conservation importance of far southern islands, management plans for some are including the active eradication of introduced species." He argues, however, that the reindeer's scientific interest warrants their remaining on South Georgia. Their presence is currently an attraction for tourists, and there is much to be learned from continuing studies.

### 3.5 Other introduced species: mice and rats

There have been a number of other animals (geese, sheep, goats, pigs, horses, cattle, rabbits, dogs, fox) and plants introduced on South Georgia, all of which date back to the days of whaling and sealing. Some were intended to supply the men with fresh meat, some for draft, sport or companionship. None of these became established as feral population (Headland, 1984). Rodents are exceptions: introduced accidentally, undoubtedly from the ships of whalers some time around 1800, they have maintained feral populations (Pye & Bonner, 1980).

Brown rats (Rattus norvegicus) of South Georgia are omnivorous

and prey on birds as well as grass, seeds, beetles, and carrion (Leader-Williams and Walton, 1989). They have adapted successfully to the climate, limiting their range mainly to lowland tussock grass, which they use both as cover and as food. They make their homes in the stools of the tussock grass where petrels nest, and are believed to eat petrel eggs and chicks. Where reindeer are present they may eat down the grass, exposing the rats and making them susceptible to skuas. The petrels continue to nest in the bare areas, where they appear to loose fewer chicks to rats, but continue to be predated by skuas (Leader-Williams and Walton, 1989:512).

Rats have had little effect on the vegetation, and prospects for their eradication seem remote (Leader-Williams and Walton, 1989).

House mice (Mus musculus) were discovered on the south side of Shallop Cove, Queen Maud Bay, during the BAS 1976-76 field season. They were previously unknown on South Georgia though known to occur on other subantarctic islands (Bonner and Leader-Williams, 1977). Their impact on South Georgia is also thought limited to the local habitat.

### 3.6 Summary: management action indicators

The administration of South Georgia has the power to "provide for regulating the management and use of living resources" (Section 6, subsection 2). Changes in natural balance discussed in this chapter suggest a strong need for action to be taken. Areas of most concern are:

1) Seals. The unexpected recovery of the fur seal population has caused damage to tussock habitats and to the fauna associated with it like the dove prion, blue petrel, common diving petrel, whitechinned petrel and the two endemic birds: South Georgia pipit, and the South Georgia pintail. Other impacts include possible benefits to the giant petrels and the indirect change in breeding success of the wandering albatross. Evidence indicates that their numbers are greater than during the pre-exploitation period. Despite recommendations for culling, no management action has been taken. Appropriate management decisions would be to determine acceptable levels of population change and, take whatever action may be needed to achieve objectives.

The ordinances which covered elephant seals have allowed them to maintain their numbers at levels which cause little immediate change to their impact. However, since they are the only population of elephant seals not in decline, management would be wise to analyze the present conditions and set standards against which they can compare future changes.

2) Reindeer. Due to their restricted range on South Georgia, reindeer have had limited but significant impacts on plant communities. No species of vascular plant has been known to be lost permanently but recovery of the plants does take decades and this must be weighed against other factors. Birds are also affected by the loss of tussock grassland for nesting sites and the disruption of the plants alters the habitat of the perimyloid beetle. No long range plans appear to have been made to cover the future of these reindeer.

3) Other introduced fauna: mice and rats. These have caused

local damage to plant communities and the rats are likely to have interfered with burrowing petrel populations. While the 1975 Ordinance forbids the introduction of alien fauna their eradication seems remote in light of present knowledge of their biology. Steps could be taken to discover more of their population dynamics, and to estimate their actual and potential threats to lowland ecosystems.



## CHAPTER 4

### SOUTH GEORGIA FISHERIES

"The management of natural resources for the benefit of mankind, so that their available production is harvested without unnecessary or irreversible harm to the system ...." (Holdgate, 1970:924).

South Georgia fisheries have long been recognized as economically valuable. Regulations were first introduced in 1918, with an ordinance granting licences to catch fish in the Falkland Islands and Dependencies (Falkland Islands, 1918). This ordinance, and the amendments to it, were economic measures for industry profit, not at that stage designed to maintain sustainable output. Resource management, however, came in 1982 when CCAMLR established some guidelines for the regulation of Antarctic fisheries. The most current legislation specifically covering South Georgia fisheries is the Fisheries (Transshipment and Export) Regulations 1990. This chapter addresses the status of the industry around South Georgia, its administration and management.

#### 4.1 General assessment of the fisheries industry

Over the past 20 years, a finfish and krill fisheries have been centered around South Georgia. The total take of fish in the Antarctic Peninsula, South Indian Ocean, South Orkney Islands and South Georgia area during the late 1960s and early 1970s was 2,672,357 tonnes -- South Georgia's portion was 1,449,004 tonnes or 54% of the total (Heap, 1991:48).

CCAMLR came into force with the purpose of regulating

Antarctic fisheries, notably krill. While the impetus for this Convention was the concern for the indirect effects of a large krill fishery on the Antarctic ecosystem, it has also developed conservation measures for the finfish industry. Like the Agreed Measures and CCAS, it was set up to preserve a component of the ecosystem before a catastrophic decline (Nicols, 1991).

While the average tonnes caught in the 12 years before CCAMLR was lower (67,139 versus 80,417), the species and size of fish caught first were those of highest economic value, a trend reminiscent of the whaling industry (Heap, 1991:49).

#### 4.2 Primary species involved

In the late 1960s, early 1970s, the commercial industry was supported by the catch of marbled rockcod (Notothenia rossii), which had yielded about 500,000 tonnes during 1969 and 1970 (Kock and Koster, 1990:308) (McKenna, 1991:643). However, by 1985, the stock estimates indicated that the current size was less than 10% of the original.

Since 1975/76, the industry was supported by catches of the mackerel icefish (Champsocephalus gunnari) but that too is showing signs of decline. The highest catches were 240,000, 220,000, and 100,000 tonnes in 1976/77-1977/78, 1982/83-1983/84 and 1986/87-1987/88 respectively (Kock and Koster, 1990:308).

Patagonotothen br. guntheri is the only species which was unregulated until 1988/89. Although stock assessment is hampered by many uncertainties, stock size and recruitment indicate a downward trend (ibid.).

Estimates of other species in South Georgia's waters show a decline by as much as two orders of magnitude between 1975-76 and 1980-81 (McKenna, 1991:643).

#### 4.3 CCAMLR's regulations

CCAMLR did not prevent the depletion of fish stock around South Georgia; the convention was ratified after the most damaging exploitation had occurred. Conservation measures are now principally aimed at N. rossii, C. gunnari and P. br. guntheri though they may benefit other species as well (Kock and Koster, 1990).

Kock and Koster's (1990:319) study of these fish and the effect of CCAMLR's conservation measures on their recovery revealed that for N. rossii, the recovery rate was slow at seasonal catch levels of zero or less than 1,000 tonnes, but that catches exceeding 1,000 tonnes could lead to a collapse of the stock. If limits were kept below 1,000 tonnes, an increase in stock size to about 40,000 tonnes could be expected by the year 2000. Of the conservation measures introduced to protect this species the authors concluded that; 1) CCAMLR's 1986 measure prohibiting any direct fishing has had an immediate benefit, 2) the closed season from 1 April to 30 September 1988, aimed at protecting C. gunnari and the spawning and spawning grounds of N. rossii were so far inconclusive, 3) the prohibition of fishing in waters within 12 nautical miles of South Georgia should have some effect, but 4) the benefits from mesh size regulations are likely to be nil because the juveniles who could escape from nets with a larger mesh size,

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inhabited the fjords and are not accessible to trawl nets.

The assessment of stock size of C. gunnari around South Georgia is dependent on age classes, of which age class 2, is not fully recruited. Kock and Koster (1990:320) found that "Spawning stock size...kept at a medium level...would allow strong year classes ... and a reasonable yield for the fishery as well as minimizing the risk of a stock's collapse as a result of recruitment failure." CCAMLR's 1987 total allowable catch (TAC) limits seemed to be of immediate benefit for the stock. Additionally, by increasing the mesh size, fish would be larger at first capture pushing up the yield and spawning stock biomass per recruit.

Two additional recommendations were made: the closed season be extended to 1 March and the setting of a low catch quota for directed fishing be imposed as is done with N. rossii. The predicted stock size for the 1989/90 season was between 66,000-124,000 tonnes.

Less information is available on Patagonotothen br. guntheri as it was not regulated until 1988/89 but it is believed by the authors that there is a downward trend in both stock size and recruitment.

#### 4.4 Krill industry and management

"The myth of the krill fishery being insignificant is still being perpetrated ....when the Convention (CCAMLR) was ratified in 1980, the krill catch was 424,821 tonnes making it the world's 24th largest fishery....It also dwarfed the other fisheries in the South Ocean being 80% of the catch from these waters" (Nicols, 1991:229).

Although catches of krill have declined from the high levels

of the early 1980s, 374,392 tonnes were harvested from Antarctic waters in 1989/90. This industry still dominates both the world crustacean catches and the Southern Ocean fisheries (ibid).

Management of the krill fishery, i.e., catch limits in FAO subarea 48.3 (South Georgia), were discussed during the eighth and ninth meetings of the Commission but it was decided that "setting of management measures on krill catches was not justified by the available scientific evidence" (ibid.1991:234). Further, the Scientific Committee of the Commission stated that "it would not be able to perform this function in the foreseeable future" (ibid).

The problem with this approach, says Nicols is that, "It is unlikely that information on krill, or on any other harvested stock, will ever be free from uncertainties and it has been pointed out that the Commission must devise methods for take account of this uncertainty when making decisions on management" (ibid.).

He faults CCAMLR for neglecting one of its fundamental reasons for being. "The fishery," he says, "at present is held in check by unfavourable economic conditions but there is still no regulation which might prevent a drastic increase in fishing effort should economic climate change" (ibid:230).

The absence of management can become a form of management itself. The Working Group on Krill has developed a number of potential schemes which are awaiting consideration.

#### 4.5 Impact of krill harvesting on fisheries

The harvesting of krill in the waters around South Georgia affects other fauna in several ways.

First, the decline in the population of baleen whales has meant that some 150 million tons of krill, formerly utilized by them, has become available in the Southern Ocean. This has led to the judgment that this krill surplus has been taken up by other consumers both directly and indirectly (Laws, 1985:26).

Second, the potential yield of krill, estimated at between 50 million and 150 million tonnes, could become an economically viable industry but work must be done to determine what is a maximum sustainable yield (Falkland Island Economic Study, 1982:78).

Finally, recent work on the trophic relationships of the demersal fish community of South Georgia (McKenna 1991) has revealed that the reduction of krill, upon which these communities depend (both in a primary and secondary scheme), may adversely impact the yield of other commercially valuable fish, notably Chamsocephalus gunnari, Notothenia rossii, Dissostichus eleginoides, Chaenocephalus aceratus, Pseudochaenichthys georgianus, Notothenia gibberifrons, and Notothenia squamifrons. McKenna (1991:652) concludes that "The availability of krill to these fish and their prey, and the fish's ability to emphasize krill in their diets, will strongly influence the yield of fish from the South Georgia community."

#### 4.6 Fisheries as a source of revenue

Several factors influence the feasibility of a fishing industry around South Georgia; legislation for maintaining and protecting both stocks and industry (conservation), the collection of fees for allowing foreign vessels to fish its waters, and an economically viable industry with well-established procedures and markets.

First, without "the management of natural resources ... so that their available production is harvested without unnecessary or irreversible harm to the system," an effective management system must be in place (Holdgate, 1970). At present only CCAMLR devises the specific conservation measures which control and to some degree protect the Southern Ocean fisheries.

Initially the problem of fee collection was solved by South Georgia's Fisheries (Transshipment and Export) Regulation 1990, which was instituted when vessels were transshipping within the territorial waters of South Georgia without permission (and without paying a fee). This system operated well until the conflict among the republics of the Soviet Union resulted in the non-payment of required fees due to the question of ownership of the Soviet fleet. Because South Georgia has only a 12 nautical mile territorial limit, and has not declared a 200 nautical mile Exclusive Economic Zone, it had no authority to enforce the regulation and collect the fees (Heap, 1992, personal communication). Both Heap (1991) and members of the Falkland Islands Economic Study (1982) recommended that South Georgia's territorial limits be extended from 12 nautical mile to 200 nautical mile, an especially important development if downward trends in fish stocks continues.

Finally, in addition to the management concerns of ensuring that there are fish and crustaceans to harvest, there are economic conditions upon which will depend both the short and long term future of the fishery industry. In particular, the harvesting and processing of krill require both advanced technology and the skills to run a long-distance trawler fleet (Falkland Islands Economic Study, 1982). Though there are a number of countries capable of



pursuing this industry, Norway, Spain, Poland, Japan, Germany, the United Kingdom, Russia, none of them except perhaps Poland, are in great need of a new protein source (Falkland Islands Economic Study, 1982). The nations in need of additional sources of protein have neither the technology nor the culinary demand for krill.

Should a strong market develop for the krill fishery, then nations including Great Britain, would be in an advantageous position to develop the additional telecommunications technology to utilize a fishery industry in the waters of South Georgia.

#### 4.7 Summary

South Georgia's fisheries industry has been more successfully managed than its earlier sealing and whaling industries, due in large part to CCAMLR's establishing quotas, guidelines, and monitoring of fish stocks in the Southern Ocean around South Georgia. Although CCAMLR was instituted after most of the stocks had been fished heavily, it appears to have been working successfully in ways which benefit South Georgia's stocks. The continued involvement of policy-makers and scientists in deciding on future conservation measures is essential.

Future profit of South Georgia, will demand more on the management of the fisheries, starting with the declaration of a 200nm Exclusive Economic Zone, economically advantageous markets, and the collection of fees or possibly developing its own fleet.

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## CHAPTER 5

### ECOTOURISM AND SCIENCE IN SOUTH GEORGIA

#### 5.1 Tourism

Managers of natural areas concerned with wildlife conservation and resource conservation are in some instances required to contend with another challenge -- conservation of amenity, defined by Holdgate (1970:934) as "the protection of, visually important features of the landscape, for aesthetic reasons". This new demand is epitomized by ecotourism, the fastest growing segment of tourism, the largest civilian industry in the world (Ceballos-Lascurain, 1991:31). Ecotourism "involves travelling to relatively undisturbed natural areas with the objective of admiring, studying and enjoying the scenery and its wild plants and animals, as well as any cultural aspects found there" (ibid.).

Ecotourism has caused managers of many remote areas to redefine goals and guidelines in order to protect these areas. In this developing industry, both managers and "ecotourists" must recognize the difference between ecotourism and conventional tourism. Conventional tourists may go to a place "out of interest in the activities that have little or nothing to do with a true concern for the nature or ecology of the site .... In contrast, the ecotourist is attracted to a natural area per se, to observe, study and admire its natural features and practice the nonconsumptive use of wildlife and natural resources" (ibid:32).

Competition for space and its uses challenges managers and

often pits users against each other. In subantarctic regions, because of the short seasons, tourists and scientists sometimes find themselves competing for the same sites and observing the same ecosystems. This can create conflicts which again, managers must consider in planning for the area. Of Antarctica (Laws, 1991:9) says "Right now, the major threat to the continent is ... tourists. There is already one hotel there, complete with garbage and the inevitable penguin-kicking yahoos."

South Georgia is protected to a level consistent with International Union for the Conservation of Nature and Natural Resources (IUCN) Category 1 (Scientific/Strict Nature Reserve). Entry to and activities on the island are governed by permit, and are restricted to people associated with research and management. Permits may be issued only to provide essential food, specimens for scientific and educational purposes, and the management of living resources. Cooper Island is designated a Specially Protected Area, Bird Island and Annenkov Island are Sites of Special Scientific Interest, and Grytviken and Bay of Isles are Sites of Special Tourist Interest (Clark and Dingwall, 1985:142-143).

Roberts' recognition of the potential for development of tourism on South Georgia was embodied in the 1975 Ordinance, which specified in particular the need for creating special tourist areas. The aim was "to restrict tourist visits to specified localities until more is known about their effects" (*ibid*:101).

This chapter compiles information on the numbers of tourists and other non-governmental groups visiting South Georgia and discusses the implications of the findings.

## 5.2 The numbers of visitors

It has proven difficult to obtain detailed data from official (i.e. administration) sources on numbers of tourists visiting South Georgia (see below). The information provided here comes from a variety of other sources. Table 5.1 lists ships and company/organizer (sometimes only the name of the ship's captain is available) that have taken passengers to South Georgia since 1970, and is compiled from two sources: Robert Headland's Chronological List of Antarctic Expeditions and Related Historical Events, which has been scanned solely for entries containing the word 'tourist', and information supplied by tour companies. This information is not intended for publication as all trips have not been not verified. The number of trips listed to South Georgia from 1987 to 1989 is suspected to be inaccurate.

Table 5.2 has been compiled by the Division of Polar Programs, National Science Foundation (NSF), Washington, D.C. in accordance with the reporting processes required under the Antarctic Treaty. This lists only ships of U.S. origin that have a legal requirement to file returns: they include a majority of all passengers to South Georgia. This table reports only the tourists visiting South Georgia during 1990 and 1991.

Table 5.3 catalogues private expeditions to South Georgia, and Table 5.4 lists other governmental scientific expeditions to South Georgia, both are compiled from Headland's Chronology (1988): Table 5.4 is supplemented from a variety of sources including expedition publications.

Table 5.1 Visits of tour ships to South Georgia  
1970-1992 with estimated maximum numbers of passengers (Based on  
Headland, 1992)

<u>Date/# of visits</u>	<u>Company/Organizer</u>	<u>Ship</u>	<u>#of passengers</u>
1970(3x?)	Lars-Eric Lindblad	Lindblad Explorer	270
1972(2x?)	Bjarne Aas	Society Explorer	180
1974-5 (4x)	Hasse Nilsson	Society Explorer	360
1975-6	Hasse Nilsson	Society Explorer	90
1976-77 (3x)	Hasse Nilsson	Society Explorer	270
1979-80	Heinz Aye	World Discoverer	130
1980-81 (4x)	Heinz Aye	World Discoverer	520
(4x)	Hasse Nilsson	Society Explorer	360
1981-82 (4x)	Heinz Aye	World Discoverer	520
1983-84 (3x)	Heinz Aye	World Discoverer	360
(3x)	Leif Skog	Society Explorer	270
1985-6	Heinz Aye	World Discoverer	130
	Werner Wolkerstorfer	Society Explorer	90
	Lindblad Travel	Illiria(T)	80-100
1986-87	Heinz Aye	World Discoverer	130
	Werner Wolkerstorfer	Society Explorer	90
1987-88 (9x)	Rudiger Hannemann	World Discoverer	1170
(9x)	Heinz Aye	Society Explorer	810
1988-89 (9x)	?(2931/13Dec/89)	World Discoverer	1170
(9x)	?(1929/19Dec89)	Society Explorer	810
1990-91	Karl-Ulrich Lampe	World Discoverer	130
	?	Illiria	80-100
	?	*Polar Circle	80
	?	Europa	?
	?	Ocean Princess	400
(3x)	Society Expeditions	Society Explorer	270
	Salen Lindblad	Frontier Spirit	164
1991-92	Karl-Ulrich Lampe	World Discoverer	130
	Rudolf Zander	Society Explorer	90
(2x)	Salen Lindblad	Frontier Spirit	328
(3x)	International Cruise	Columbus Caravelle (IC)	750
		Total	10,272

T Denotes Travel Dynamics Source  
IC Denotes International Cruise Center, Inc. Source  
\*Polar Circle (passenger estimate 80)(Karlqvist,1992)

Table 5.2 Numbers of passengers and sites visited 1990/91  
 Source: National Science Foundation

Site	1990	#Visits	#Passengers	1991	#Visits	#Passengers
Grytviken Station	4		501		5	420
Salisbury Plain	4		412		4	307
Gold Harbour	3		274		3	282
Prion Island	3		260		3	280
Larsen Harbour	--		--		2*	191*
Prince Olaf Harbour	2		171		1	105
Rosita Harbour	--		--		1*	98*
Cooper Harbour	--		--		1*	90*
Fortuna Bay	--		--		1	90
Welcome Islands	--		--		1	89
Albatross Island	1		142		2	88
Ample Bay	--		--		1	88
Elsehul Bay	1		84		1*	52*
Moltke Harbour	--		--		1	45
St. Andrews Bay --			--		1	45
Stromness Bay	--		--		1	36
Husvik Harbour	--		--		1	19
Leith Harbour	1		142		--	--
Will Point	--		--		--	--
Royal Bay	<u>1</u>		<u>97</u>		--	--
Total	20		2083		25	2325

(\* zodiac cruise only, no landing)

Table 5.1 lists voyages from 1970 to the beginning of 1992, and indicates a total of 10,272 passengers spread over 15 seasons, a mean of 705 per season. Table 5.2 details the number of passengers that visited in 1990 and 1991. The inconsistency, immediately apparent between the NSF 1991 passenger count (2325) and Headland's estimates during the same period may be due to the presence of NSF observers on board the ships in this season.

If an estimate of total passengers from 1970-1989 is made using Headland's estimate of 7830 and the NSF 1990 and 1991 totals of 4408, then approximately 12,238 tourists have visited South Georgia.

This figure indicates a substantial jump in the numbers of tourists visiting after 1986. From 1987 until 1992, approximately 6622 tourists, representing 54% of the total number of tourists since 1970, have travelled to South Georgia.

Table 5.2 also provides information on sites visited in 1990 and 1991 and makes it clear that far more areas are being visited than those specified in Schedule C of the 1975 Ordinance. Permitted areas for tourists visits are:

- 1) Grytviken. The area bounded by Moraine Fjord, Hamberg Glacier, Mount Sugartop and Lyell Glacier.

and

- 2) Bay of Isles. The area between Cape Buller and Cape Wilson inland to the height of land, together with all the islands and rocks in this bay.

Sites on the NSF list that do not come under Schedule C are: Elsehul Bay, Welcome Islands, Fortuna Bay, Husvik Harbour, Cooper



Harbor, Gold Harbour, Will Point (listed but not visited in 1990 or 1991), Royal Bay, Moltke Harbour, St Andrews Bay, Stromness Bay, Prince Olaf Harbour, Leith Harbour and Larsen Harbour.

This does not imply that these visits are illegal. It is customary for cruise directors to seek permission by radio to visit non-scheduled areas, and this permission is usually granted without question by the magistrate or his deputy (Stonehouse, personal communication). However during 1991, some 64% of the sites visited were not on Schedule C.

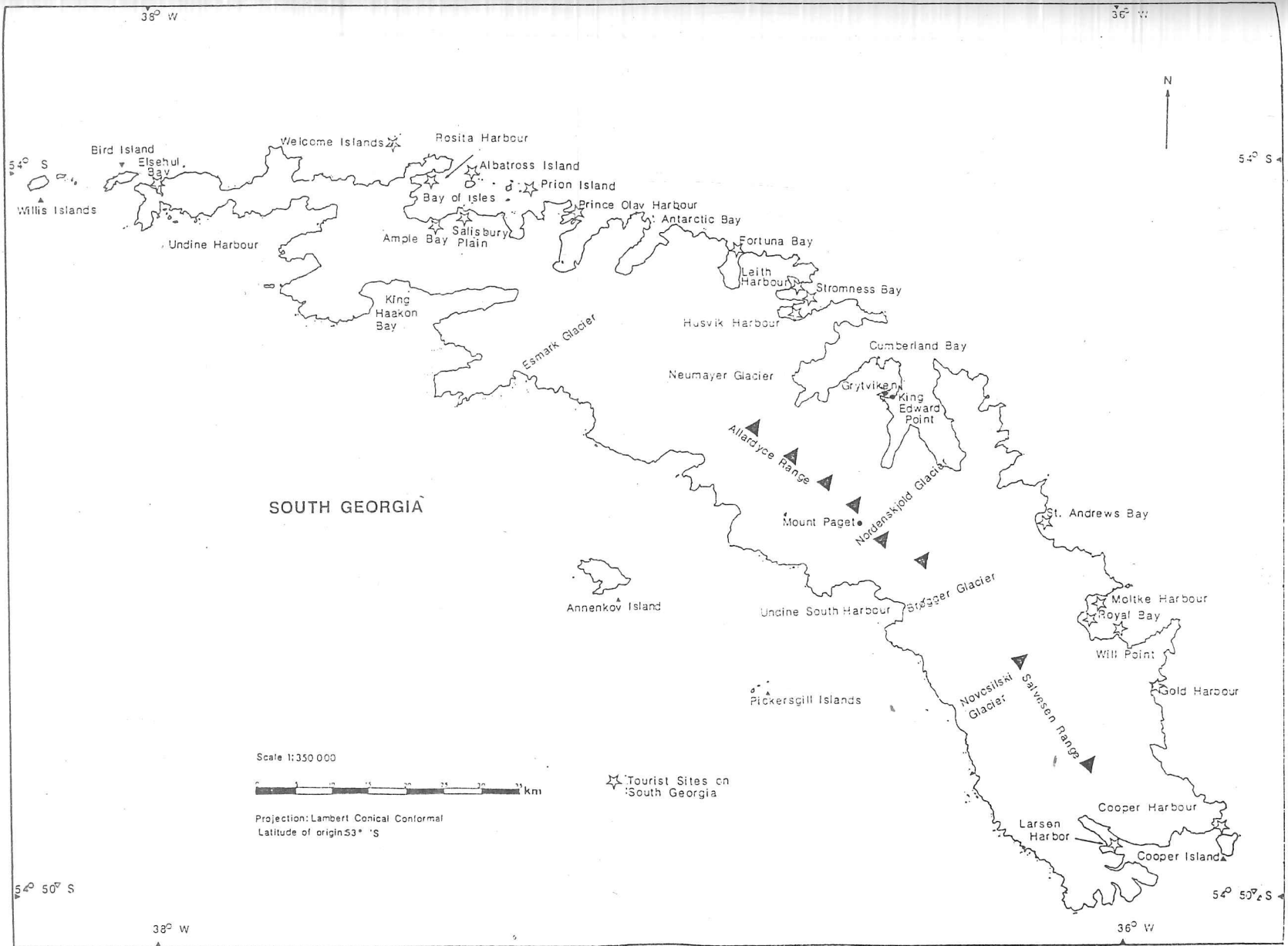


Figure 5.1 Location map of tourist sites on South Georgia  
(From NSF 1991)

Table 5.3 Non-scientific voyages (Source Headland, 1992)

- 1969-72 French yacht cruise (Gerard Janichon and Jerome Poncet)
- 1972-73 French voyage (Jaques-Yves Cousteau and Jean Allnat)
- 1973-74 Italian yacht cruise (Giovanni Ajmone-Cat)
- 1977-79 French yacht cruise (Jerome Poncet)
- 1978-79 Champi (Jacques Peignon of France) and Kotick  
(Oleg Bely of France) yacht cruises (BH)
- 1979-80 Basile (Bertrand Dubois of France) and Momo (Charles Ferchaud of France) yacht cruises (BH)
- 1980-82 Kim (Daniel Gazanion of France) (BH)
- 1981-82 Isatis [II] (Jean Lescure of France) (BH)
- 1982 Cinq Gars Pour (Olivier Gounon of France) and  
Quakster (Carl Freeman of Australia) yacht cruises
- 1982-83 Graham (Philippe Cardis of France) yacht cruise
- 1982-84 Damien II (Jerome Poncet of France) yacht cruise
- 1983-84 Koala (A. Pasqualini of France) yacht cruise
- 1984-86 New Zealand yacht cruise Totore (Gerald S.Clark)
- 1985-86 Skua (Frederic Andre of France)  
Aomi (Capt. Yoshi of Japan)  
Belle-Etoile (Jean-Joseph Terrier of France)  
Cocorli (Olivier Troalen of France)  
Kotick (Oleg Bely of France)  
Rapa-Nui (Patrick Jordan of France)  
Palawan (Thomas J. Watson of United States)  
yacht cruises to South Georgia region
- 1985-88 French yacht cruise Damien II (Jerome Poncet)
- 1986-87 Leisurely Leo (Britian) (BH)

Table 5.3 lists the non-scientific voyages to South Georgia from 1969 to 1987. There is no comprehensive source of information available about how many passengers were carried (though the numbers are probably small), areas visited, or purpose of the visits. There is a strong chance that many voyages in this category went unrecorded: I have not located a reliable source to confirm this information.

It may be deemed a duty of any responsible mariner to register his presence in South Georgia waters with the magistrate (or more recently the harbour master) at King Edward Point, the recognized seat of administration. Whether or not this formality is observed depends very much on the sense of responsibility of the mariner concerned. All tour operators know of the requirement to register at Grytviken and report the locations of their proposed landings (Zuckerman, 1992, personal communication). Non-scientific voyages may not regard themselves as tour ships, and may fear to register for a number of reasons including ignorance, non-recognition of sovereignty, and a desire to avoid official contacts.

Table 5.4 Other governmental scientific parties (Headland, 1992)

1975-76	German (BRD) fisheries voyage
1977-78	German (BRD) fisheries voyage
1977-78	Polish fisheries voyage
1978	South African Naval voyage
1979-80	German (DDR) expeditions (3)
1980	German (DDR) fisheries voyage
1980-81	German (BRD) expeditions
1980-81	United States Antarctic Program
1981-82	Soviet Union expedition
1982-83	German (BRD) expedition
1983-84	Soviet Union expedition
1984-85	Norweign expedition
1985-86	Soviet Union fisheries voyage
1986	Swedish expedition
1986-87	Dutch South Georgia Expedition
1986-87	Soviet Union fisheries voyage
1986-87	United States and Polish oceanographic voyage
1990-91	*Swedish Antarctic Research Programme; South Georgia

\*Source (Karlquist, 1992)

Table 5.4 lists the other governmental scientific visits to South Georgia and expresses the continued international interest in scientific work on the island, and the usefulness of South Georgia as a venue for private expeditions to the Antarctic fringe. British Antarctic Survey (BAS) advises South Georgia administration as to what projects should be allowed to use South Georgia as a study site. I have not been able to locate a reliable source of the numbers of personal involved, but they are mostly small parties of 4-8 members.

### 5.3 Management: potential concerns

The increase in the number of tourists to South Georgia in recent years, and their entry into unscheduled areas of the island, raise two matters of management concerns.

Roberts' recommendation that tourist sites be set aside brought two administrative advantages: numbers of tourists would be easier to check, and thus effects could more readily be monitored on a long-term basis. The requirement that all ships, including tour ships, register at King Edward Point before landing elsewhere on the island is basically sensible, especially as the Point lies close to Grytviken, one of the two areas scheduled for tourist visits.

However, the requirement is often waived by magistrates on the request by radio of tours' directors or ships' captains. Most tour ships approach from the west and cruise eastward along the north coast of South Georgia, calling in at two or three points on the way. Registering first at King Edward Point requires them to backtrack if they wish to visit Bay of Isles, which wastes cruising time (Stonehouse, 1992, personal communication).

The 1975 Ordinance allows the Commissioner or his designated authority to approve additional sites for landing, and this too is usually done by radio: hence the list of alternatives appearing in Table 5.2. There is no evidence that allowing passengers to land at unscheduled sites is harmful; indeed it takes pressure off some scheduled sites (for example Prion Island, Bay of Isles) which are showing clear evidence of damage from too many visits, and to this

degree is beneficial (Stonehouse, 1992, personal communication). However, there are no observers on these sites to record the numbers of passengers coming ashore, and no baseline studies or continuous monitoring to show if long-term harm is being done.

These points are in fact covered by the 1975 Ordinance: where additional sites for landing have been approved by special permit, "the Governor shall have regard to the need to monitor the effects of tourists on the natural ecological systems within these areas."

In pursuing this research I have asked the South Georgia administration for figures covering the total numbers of ships and tourists landing each year, information concerning unscheduled but permitted landings, monitoring of sites and harbour fees. I received the following response from Mr. R.C. Huxley, Government House, Falkland Islands in answer to these questions (Huxley, 1992, personal communication).

Tourist statistics are not immediately available through his office but their "educated guesstimate" for 1990/91 is 10 visits by cruise ships disembarking 900 tourists and 9 privately-owned yachts. In 1992, nine cruise ships and four yachts had registered from January to April 1992.

Regarding visits not on Schedule C. The 1975 Ordinance has not been amended and "On a case by case basis, following application to the Commissioner, the occasional cruise vessel is permitted to visit restricted areas - but only after we have sought advice from BAS."

Monitoring tourist sites is done as limited financial resources permit and "harbour fees" of \$10 U.S. are levied on tourists landing on South Georgia. This fee is expected to increase

next austral summer.

This response points out the significant discrepancy between the "educated guesstimate" made by the administration and NSF's figures. This suggests that many passengers are unaccounted for and ships may not be registering first at King Edward Point.

Further, the monitoring, called for by the 1975 Ordinance, is not being done due to financial constraints but could be provided through increased fees and on-site observers.

#### 5.4 Summary

The numbers of people visiting South Georgia since 1970 has been significant. Over 12,000 tourists, an unknown number of persons from private expeditions, and an unspecified number of non-governmental scientific expeditions have all sought the island as a destination.

The incompatibility between administration figures (900 passengers in 1991) and the NSF figures (2083 in 1991) provides the best indication management action is clearly required and monitoring of sites is even more essential.



## CHAPTER 6

### MACQUARIE ISLAND: A MANAGEMENT MODEL?

The previous chapters have outlined South Georgia's resources, their historic exploitation, the administration's response by regulation and the potential challenges to the island's land ecology. The question left to answer is whether or not legislation currently covering South Georgia is sufficient to cope with the challenges presented by the influx of tourists, and to a lesser extent scientists, on the land environment.

#### 6.1 Management plans on other subantarctic islands

South Georgia and Macquarie Island are comparable in two respects. They are ecologically similar and because neither are under ATS jurisdiction, their administrations do not have to refer to other nations for approval of legislation or management. That is not to say that no political decision is required. "Effective conservation does not only consist of scientific requirements, but also of political will and legal obligation" (Heap, 1987:15).

On behalf of Scientific Committee for Antarctic Research (SCAR), Bonner and Lewis Smith (1985:195) reviewed Antarctic conservation areas outside ATS. They identified nine subantarctic islands including South Georgia and Macquarie Island

Table 6.1 Status of management plans on subantarctic Islands outside the ATS

<u>Island Group</u>	<u>Nationality of claimant</u>	<u>Management status and notes</u>
Bouvetoya	Norway	Nature Reserve
Prince Edward Island	South African	Conservation and management plan
Iles Crozet	France	Conservation and management under 'Parc national antarctique francais.'
Iles Kerguelen	France	As above
Heard Island	Australia	Conservation and management plan
McDonald Islands	Australia	Conservation and management plan
Macquarie Island	Australia	Declared a Nature Sanctuary in 1933, Nature Reserve in 1978
South Georgia Island	Britain and Argentina	Management under Falkland Islands Dependencies Conservation Ordinance 1975
South Sandwich Islands	Britain and Argentina	As above

Of these nine groups of islands, only Macquarie Island and South Georgia are currently visited by tourists and scientific parties on a regular basis. Macquarie Island has long been a protected area and has chosen to regulate its tourist visits

through a comprehensive management program. For this reason, it provides a useful comparative model for South Georgia.

## 6.2 Macquarie Island Management Plan

### 6.2.1 Brief history of management

A part of Van Diemens Land when it became a separate colony in 1825, Macquarie is now part of the State of Tasmania. It was first protected in 1933, when the State made it a sanctuary under their Animals and Birds Protection Act 1928. Later, in 1971, when National Parks and Wildlife Act 1970 came into force the island became a Conservation Area. Under the same act in 1972, its status became that of a State Reserve. Further recognition came to Macquarie Island when it was declared a Biosphere Reserve in 1977 under the UNESCO "Man and the Biosphere Programme". Its status today as a Nature Reserve encompassing its present boundaries was formally named in 1978. Visits are allowed only by permit.

Concern with conservation has lead to the develop a comprehensive management plan for Macquarie Island. The plan, drafted in 1990 and promulgated in June 1991, was prepared in accordance with the requirements of the National Parks and Wildlife Act 1970.

### 6.2.2 The current plan

Macquarie Island's management plan, Macquarie Island Nature Reserve Management Plan (MINRMP)(Department of Parks, 1991a), is composed of three parts: 1) an account of the physical features of

the reserve, its flora and fauna, historical aspects and present facilities; 2) management objectives; and 3) management prescriptions.

#### 6.2.2 a The assessment process

The first part of the plan is a physical description including a thorough assessment of the historical features and the status of its flora and fauna. In the appendices of the plan are checklists of vascular flora, mammals, birds and fish including a status key which indicates the population within the group. The appendices also include a list of "non-scientific visits and proposals."

#### 6.2.2 b Management objectives

Part two of the plan sets out the objectives of management which are:

"1. To protect and manage the reserve as a natural habitat for its indigenous flora and fauna and in order to achieve ecosystem conservation.

2. To seek to protect and preserve the marine habitat adjacent to the reserve in so far as it provides access and/or feeding grounds for the majority of the indigenous fauna.

3. To conduct, promote and encourage research and studies in so far as they have no permanent detrimental effects into the natural and cultural aspects of the reserve, the surrounding seas and the region.

4. To prevent accidental introductions of alien flora or fauna as far as possible to eradicate or control previously introduced species which affect or endanger native species.

5. To record, protect and/or preserve any historic localities,

artefacts or relics found in the reserve or adjacent waters.

6. To permit tourist visits under strictly controlled conditions which allow visitors to experience the natural values of the island without compromising them.

7. To publicise and promote the State's successful management of the island as a Nature Reserve and internationally recognised "Biosphere Reserve."

These goals cover most aspects of the island's resources; its flora and fauna, surrounding marine habitats, cultural and historic localities, and tourism.

#### 6.2.2 c Management prescriptions

The prescriptions are the strategies applied to the areas of concern in order to accomplish their objectives. The areas outlined are: a) rubbish and sewage disposal, b) fuel storage and supply, c) vehicle, boat and aircraft use, d) tourist and non-study visits, g) research, e) historical, f) prevention of introductions of exotic species, g) wildlife management, and h) administration and staffing.

After each topic, is a brief explanatory paragraph of the current condition and the management strategy applied.

Reference to tourism is of particular interest because it is a new challenge to managers; Macquarie is one of only two southern islands that have included it in their management plan.

Tourism is permitted but visits are ship-based and passengers are restricted to "limited facilities such as walkways, viewing platforms and interpretation material ... in selected areas to protect the wildlife, environment, historical and/or scientific values of the reserve" (Department of Parks, 1991a:23).

Guidelines for Tourism Operations is issued as an addendum to the plan offering a flexibility if changes are recommended. This is a list of what tourists should not do (feed wildlife, bring exotic plants ashore) rather than indicate possible visitor experiences.

Within this management prescription, is a section on the monitoring of tourism and of non-study visits (section 3.6.4) which is to be maintained by the managing authority (the Director of National Parks and Wildlife) and used to revise the Guidelines when appropriate. This monitoring is done through a supplementary paper, Tourist Visits to Macquarie Island 1990/91, offering an analysis of the visits and suggestions in order to modify and improve the existing prescription and guidelines.

The 1990/91 paper concluded that during the year no undue disturbance to wildlife occurred but cautioned that any obvious effects that might have taken place will not be apparent for several years. For this reason, it recommended that tourist visits, both in numbers and duration, to the reserve not be altered for at least five seasons (Department of Parks, 1991b).

One method of analyzing the visits was through the solicitation of information on visitor satisfaction and perceptions. Two hundred questionnaires were collected from the 559 visitors. At the time of publication they were still being analyzed but the planners generally found that most people came to see the island's national history and that they felt their movements were not unduly restricted (ibid.).

As a member of a tourist expedition to Macquarie Island in December 1990 I participated in a visitor survey. Because of my

expressed interest in management, I was also asked by one of the rangers to report on off-record comments about the visit. There was a divergence in the sentiments toward the restricted nature of the visit. Some participants, generally, the lecturers and older passengers (55 years plus), felt that the rules were too restrictive. We had been organized in small groups and confined to certain areas, being allowed to move to another location only after the other groups had moved off. One experienced lecturer was overheard to say that they would avoid going back to Macquarie Island due to the lack of personal experience, i.e., passengers were too tightly confined to restricted areas. Younger passengers (25-45) indicated that they felt the restrictions were not oppressive. This diversion of attitudes may be attributable to the former group being more travelled (and allowed more freedom in the past) and thus having different expectations from those of the younger group.

A second area encompassed in the plan is administration and staffing. On-site rangers are available to educate and enforce visitors about the island and its regulations.

### 6.3 Analysis of the plan

Macquarie Island's management planners have fashioned a comprehensive and useful document with relevance to South Georgia. First, and most importantly, the designers have defined their objectives for the island and, having done so, developed specific areas they feel are necessary to consider, encompassing the needs of science, wildlife, and outside users, and the

practical problems of administration in accomplishing these objectives. Second, because the plan has included a section on current conditions, it provides a baseline against which they can measure changes, and recommend studies by which changes may be detected. Finally, monitoring and on-site staff are integral parts of the plan. This is particularly noteworthy under the section on tourism. Not only is tourism monitored, but there are people on-site to conduct this work.

Macquarie Island's designation as a Nature Reserve does not require tourism be included in its planning for its future. In this respect, its underlying philosophy is different than South Georgia's which has provided for tourism since 1975. The latter's greater geographic area and number of available tourist sites could allow planners a less restrictive form of management. This touches on the weakness of the Macquarie plan as well as many other planning documents of its kind; it is based on what activities people are forbidden to do, not what they are allowed to do. If tourism is to be encouraged on South Georgia, then it would be sensible to provide positive opportunities for tourists that make them feel welcome.

#### 6.4 Summary

Macquarie Island's plan includes a description of the flora and fauna, objectives for management, and management prescriptions to achieve these objectives. As part of the plan, guidelines for tourism operations have been produced, which outlines the way tourism is handled by the island's staff. Because Macquarie and



South Georgia are both ecologically similar and are the only two subantarctic islands outside the ATS to handle tourists, its usefulness as a model approach for management is worth considering. For South Georgia administration, the important difference is in the underlying philosophy of the plan which only allows for a limited number of tourists but does not encourage them. The greater area and number of tourist sites on South Georgia could permit a more generous approach.

## CHAPTER 7

### A POSSIBLE MODEL FOR SOUTHERN ISLANDS: GRAEFE AND VISITOR IMPACT MANAGEMENT

#### 7.1 Developing a management plan

The goal of an environmental management plan should be to provide planners and managers with an approach to reduce or control adverse environmental impacts.

In this regard, South Georgia and Macquarie Island present similar problems and management issues. Macquarie Island's approach is an empirical one with a somewhat limited application to tourism. To fill in that gap, I turn to the approach of the Graefe et al (1990) whose Visitor Impact Management (VIM) plan was created to assist planners in U.S. national parks. It provides a methodology and structure that can be used by managers in other remote areas; its authors have applied it successfully to a number of different environments within the park system.

Its framework is suitable for other kinds of impact (wildlife conservation for example) but not all areas of concern can be covered in this thesis. Instead, it will be examined primarily for its approach to VIM.

### 7.3 The process for VIM

The creation of a VIM system involves more than identifying adverse impacts and imposing limits on use. Graefes emphasize that "the lessons from previous studies ... found only weak or indirect relationship between impacts and overall use levels" (ibid:9-18).

The steps recommended by the model toward creating a management system are:

- 1). A summary of the requirements and status of current situation. The manager must compile all of the relevant information on the site, its components, and records of past, present, and proposed future use.
  
- 2). A review of management objectives. According to Graefe, the "major shortcoming in most ... management plans is the lack of objectives that allow managers to explicitly state the conditions they seek ...." The objectives need to be specific and go beyond generalities such as 'protect the resource' or 'provide satisfying experiences'. "To be effective, management objectives need to define the type of experience to be provided in terms of appropriate ecological and social conditions."
  
- 3). Identify the indicators and specify the levels of detail (quantify) how they will be measured and evaluated. Examples of the kinds of ecological and social impact indicators are amount of litter, visible

## 7.2 The principles of VIM

The theoretical framework for the process of devising a VIM plan is based on the principles in Table 7.1.

Table 7.1 Principles of VIM (Graefe, 1990:5-8)

Principle 1. "The purpose of visitor impact management is to identify unacceptable changes occurring as a result of visitor use and to develop management strategies to keep visitor impacts within acceptable levels."

Principle 2. "Visitor impact management can be integrated into existing agency planning, design and management processes."

Principle 3. "Visitor impact problems are complex and may be difficult to identify; hence visitor impact management should proceed on the basis of the best scientific understanding and situational information available."

Principle 4. "A critical step in visitor impact management is the determination of management objectives which identify the resource conditions to be achieved and the type of reaction experience to be provided."

Principle 5. "Visitor impact problems can be identified by comparing standards for acceptable conditions with key indicators of impact at designated times and locations."

Principle 6. "Management decisions intended to reduce impacts or maintain acceptable conditions require knowledge of the probable source of and interrelationships between unacceptable impacts."

Principle 7. "Unacceptable visitor impacts may be addressed using a wide range of alternative management techniques."

Principle 8. "When used in an area-wide planning context, visitor impact management objectives should incorporate a range of acceptable impact levels to accommodate the diversity of environments and experience opportunities present within any natural setting."

These basic principles emphasize the need for management to set goals based on a scientific understanding of systems and impacts and, when possible, use indirect management tactics to achieve established goals.

Implicit in setting goals is the judgmental matter of balancing diverse interests and values related to preservation, and determining acceptable impact levels for the different interests. For example, management may decide that the grazing of reindeer in localized areas is an acceptable level of impact but that widespread damage to tussock grass by fur seals is not. In the VIM context, revenues from visitors may need to be balanced against damage caused by numbers, and an acceptable level of damage determined.

Management tactics may themselves cause impacts. Consequently determining maximum capacities and use-limits are only one way to reduce impacts. For example, when tourism is welcome, indirect approaches of offering alternative choices are generally preferable to direct regulation of behavior. On Macquarie Island, one way of doing this would be to provide people with an opportunity to enjoy a particular location without supervision, for photography, contemplation, or observing wildlife behavior. Management would thereby gain another opportunity to monitor impact and may find that some restrictions (and their time given over to supervision) are unnecessary.

Finally, because impact problems can arise from one source or several, existing studies of the area should be followed up by the collection of new data through research and monitoring.

erosion, number of social trails, percent loss of ground cover, plant diversity, wildlife diversity, reproduction success, number of encounters with other individuals, visitor satisfaction, visitor perception of impact on environment, visitor perception of crowding, and reports of undesirable behaviors, etc.

The most useful system is one that includes a variety of sensitive indicators (capable of providing separate and accurate records of same), using the best techniques that management can afford, on as many sites as manageable.

4). Selection of management standards. After the identification of possible indicators, the managers must select standards with which to judge impacts. This requires that the management restate in quantitative terms the goals of the plan.

5). Compare standards to existing conditions. This requires some assessment of current conditions as indicated in step 3 above. If there is no inconsistency between the standard and existing conditions, then only a monitoring program is needed. However, should this stage uncover problems then it is appropriate to move to the next step of identifying probable causes and undesired impacts.

6). Identify probable causes. Because of the number of

potential factors that can contribute to impact conditions, the task here is to identify the most prominent cause or causes of the problem. This may require additional studies on the relationship between key impact indicators and visitor use patterns including assessing type of use, length of stay, size of groups, concentration of use, and behavior of visitors. Additionally, since impacts can be influenced by a variety of site-specific and seasonal variables [my emphasis], it is important that this be kept in mind.

7). Identify management strategies to resolve the adverse impact(s). Graefe points out that "one may never have a complete understanding of the causes underlying certain visitor impacts, nor can one predict exactly how a given management action will affect a particular problem situation." The important focus at this point is on the probable causes of visitor impact and not the impact conditions themselves.

The two types of management strategy that can be considered are:

- a) indirect: physical alterations that improve or barring access, information dispersal; advertise area attributes, identify surrounding opportunities, provide basic impact education, and economic constraints by charging fees[my emphasis] and
- b) direct: enforcement (fines and surveillance), zoning

to separate visitor use or site conditions, managing use intensity by rotating use of sites or limiting access points, and restricting activities by limiting size of group, length of stay, restrict particular practices and restricting the type and time of use (Table 7.2).

Table 7.2 Matrix for Evaluation of Alternative Management Strategies (Graefe, 1990:17)



8). Implement the strategies selected. Continuous monitoring of areas that experience adverse impacts is important to see whether these strategies are working or whether they need adjustments. The success of much of the process depends on the management's flexibility and response to changing conditions.

To assist managers, Graefe devised four tools for use in preparing a visitor impact management system which are readily adaptable to a subantarctic environment. These include: a checklist of questions for identification of visitor impact problems and potential solutions, sample impact assessment tools, sample systems for classification of areas by overall level of impact, and formula-based approaches to carrying capacity.

#### 7.4 Applying the Graefe model to MINRMP

The strength of the Graefe model is its comprehensive approach to building a framework for a management plan using environmental knowledge coupled with the current research on recreational carrying capacity and visitor impacts. Although designed for a use in a national park system, the methodology with some practical modifications, is applicable for use in subantarctic and antarctic conditions.

The MINRMP has organized itself in a structurally different way but has incorporated most of the principles and the process into its plan. The managers have identified unacceptable impacts, set goals and objectives, and specified prescriptions for

conditions they wish to maintain or achieve.

The plan's strengths, for dealing with tourism are; using indirect strategies such as providing educational material, having on site managers/rangers available to educate people about the site (they could be used more in this way and less in an enforcement role), and employing a system of monitoring and assessment to determine whether existing conditions match desired ones.

The main weak spot is in the area identified by Graefe as the major shortcoming in most plans; the lack of specifically defined conditions. This could ultimately lead managers to allow some activities to preempt others. In the case of tourism, without specifically defined conditions, management has chosen "direct" management strategies to curtail activity. This does not leave much room for measuring whether some activities might have minimum impact. It also suggests that the balance to "accommodate the diversity of environments and experience opportunities present within any natural setting" is not there.

#### 7.5 Summary

The principles underlying a management plan, particularly one applicable to tourist management, stress the need for management objectives and the monitoring of sites to compare the standards set with existing conditions. Graefe points out that impacts may be influenced by seasonal variables, particularly true in subantarctic environments when tourists and scientists may be competing for use in the same areas. One important consideration is the selection of direct or indirect strategies of management to apply to problem

areas.

The author cautions that the major weakness of most plans is in the lack of specifically defined conditions desired. This can ultimately lead, as noted in the case of Macquarie Island, to the overuse of direct or restrictive methods for avoiding unwanted conditions.

## CHAPTER 8

### SOUTH GEORGIA: APPLYING THE MODELS

The South Georgia administration in the past, has moved consciously from a policy of piecemeal regulations to a conservation ordinance, as new threats to the system were seen. The 1975 Ordinance was based on concepts of environmental management that were available at the time. Roberts' anticipation of the advent of tourism on South Georgia projected also the need for monitoring, which could be done more readily in specific sites which were set aside for tourists.

#### 8.1 Modifications based on MINRMP

South Georgia's current environmental challenges, the reindeer and fur seal problems, and, more alarmingly, a tourist industry growing without visible control or regulation, suggests a need for a firm management plan.

Earlier chapters have shown that management decisions are needed in many areas. In some areas there are sound scientific data: in others, notably tourism, little information on its condition and impacts have been collected. This area requires immediate attention.

Given the vastly higher number of tourists visiting South Georgia than Macquarie, 2325 in 1991 as compared with a maximum of 300, it is clear that management at Macquarie has taken seriously the impact of even a few tourists, by incorporating them into their

comprehensive plan, putting into place a monitoring program with on-site staff, and charging a fee (\$100 Australian per paying passenger is Macquarie's charge) to provide revenue to help cover the cost of rangers and support facilities. According to Peter Biggs, in Treasury Office at Stanley, Falkland Islands, South Georgia is charging \$10 U.S. per person on an unofficial basis and putting the money into the museum being developed at Grytviken (Biggs, 1992, telephone communication). The difference in the number of passengers actually going to South Georgia and the higher fees that could be collected, adds up to significant revenue.

There is apparently no policy on the numbers of visitors who can land, and due to the lack of supervision or control at any sites except Grytviken, any regulations are toothless. Macquarie Island's approach is to limit on shore visitors to 60 (15 people per group) and have rangers to accompany the visitors to designated sites. South Georgia requires only that the tour companies call in at King Edward Point before preceeding to other sites. The ship's lecturers are the only people to monitor on-site activities. These people are not being paid by the local government but by the tour companies. This is not to say that they are not protecting South Georgia but their fiduciary loyalty and responsibility is to the tour company. It is possible that on-board naturalist/supervisors responsible to South Georgia administration could be employed in that capacity.

## 8.2 APPLYING THE GRAEFE MODEL

Using Graefe's eight step process as a guidepost either toward developing a full management plan, or toward supplementary papers

augmenting the 1975 Ordinance, the following observations and recommendations are made:

1. Summary of existing conditions. BAS has a wealth of information about South Georgia's flora and fauna which are probably sufficient for this purpose.

2. A review of management objectives. The Ordinance is a legal instrument, not a practical blueprint with management objectives clearly stated. A supplementary paper might be prepared that states conservation objectives, including resource, wildlife, and amenity conditions the administration wishes to achieve.

3. Identification of indicators and levels of detail to be measured. This could also be done in a supplementary paper. For example, at tourist sites, the number of breeding birds could be one indicator or a botanical survey another. The indicator should be something measurable.

4. Determination of management standards. It is necessary to consider what are acceptable levels of impact for the various sites. Should tourist sites and scientific sites be treated the same?

5. Reviewing existing conditions. Is there a difference between desired conditions and existing conditions? This can only be done if a monitoring system is in place and staff exists to carry it out. (The Ordinance suggests that monitoring shall be conducted but no evidence is readily available that has been done.) One solution might be to use a conservation officer on board ship to monitor activities, in the way that fisheries officers were designated to do so in 1922 or the new fisheries protection officer

does with the Fisheries (Transshipment and Export) Regulations 1990.

6. Identifying probable causes of impacts. Graefe's principle 3 emphasizes that impacts are complex and may not be caused by a single factor. This may require additional study which needs to be mandated and a mechanism to trigger its use created. The Ordinance allows for the Commissioner to make any necessary rules to carry out the regulation, but it is far more effective to have in place a system that reviews conditions on a continuous basis. It is apt to be more preventative as well.

7. Identifying management strategies. This is not included in the 1975 Ordinance which was designed as a conservation instrument. Management strategies might be developed by the administration and staff responsible for monitoring conditions.

8. Implementing strategies quickly. The numbers of tourists visiting restricted sites could already be creating problems of which the administration is unaware, and could worsen before a strategy is applied.

The primary recommendation drawn from both models is that management objectives be stated and that a supplementary paper, in the form of a plan including the practical methods to achieve goals, be drafted.

### 8.3 Advantages in making a change

Ceballos-Lascurain (1991:32) points out that with increasing pressure on resources, "protected areas must show economic returns sufficient to justify their continued existence. Increasing

attention is therefore being focused on fees charged for the access and use of these areas ...." As the Macquarie Island experience has shown, some of the costs of management can be recouped from tourists themselves. Ceballos-Lascurain continues: "Once that access has been gained, strict management is required to avert environmental damage. Damaging consequences on these areas can usually be caused by poorly planned tourism. The goal is to conserve the resource behind the desire of people to travel to remote locations -- amenity" (Ceballos-Lascurain, 1991).

Averting environmental damage is, of course, the point of conservation and management. With on-site supervision or monitoring, it is possible to assess how many visitors can be accommodated, what activities can be encouraged, and when the limits of a site have been reached.

#### 8.4 Summary

Graefe's model is a well-considered framework on which can be developed a plan to assist managers in VIM in remote areas. Macquarie Island's plan is a feasible and practical application of principles of management suitable to a southern island. Both plans, in emphasizing management objectives and the continuous monitoring of possible adverse impacts, provide a model for reassessment of the current controls and regulations which the growth of tourism warrants.



## CHAPTER 9

### CONCLUSIONS

The trend toward environmental management in Antarctic regions is evidenced by the succession of conservation measures supplementing the Antarctic Treaty. Two of these are particularly noteworthy: Agreed Measures, a mini-treaty and conservation policy for the Antarctic, and CCAMLR, a protection for Antarctic marine resources including the waters surrounding South Georgia.

Agreed Measures was established in 1964 as a legal instrument to provide for the conservation of Antarctic flora and fauna. CCAMLR came later in 1982 and was more specific, it was an attempt at the practical side of conservation; setting guidelines and methods to achieve the objectives of protecting Antarctic fisheries. Although ratified after the bulk of fisheries exploitation had occurred, its recent successes through scientific research, management objectives, and continuous monitoring point out the importance of such measures.

With Agreed Measures as the basis for its conservation policy, South Georgia's 1975 Ordinance is a step beyond earlier piecemeal regulations toward a comprehensive approach. It is a good legal tool for conservation but practical measures are needed to achieve conservation policies.

The importance of a practical approach is underscored by Macquarie Island's management plan and Graefe's VIM system which emphasize management's need to set objectives for conservation, whether tourism or wildlife, and to monitor ongoing conditions. Graefe's particularly important contribution is his conclusion

about the weakness of most management plans -- the lack of specific objectives through which planners can achieve their goals. The problems on South Georgia, particularly the dramatic increase in the numbers of tourists, their entry into restricted areas and the gap in the administration's knowledge and response to it, illustrate the result of this deficiency and the lack of monitoring. While legislation is the legal device for management to act, without a prescription for management and objectives, making those decisions is difficult. Examples of this dilemma are found with the problems created by seal and reindeer populations, and the lack of an EEZ to protect fish stocks around South Georgia.

What is needed?

As a legal document, the 1975 Ordinance provides the bulk of the regulatory means to managed South Georgia. However, a supplement to that, either based on Parts 1 and 2 of Macquarie's plan and/or a system incorporating Graefe's VIM plan, would allow planners to carry out essential conservation practices.

In the area of tourism, revenue from tourist fees could be applied toward establishing on-site managers or ship-based observers to accomplish much of the record-keeping and equip scientific parties with additional data to monitor environmental conditions.

The development of a museum at Grytviken (near King Edward Point) not only attracts and encourages visitors to start tours there, reducing the problem of ships not registering and passengers not being account for, but furnishes management with an opportunity to use indirect strategies to attain desired site conditions. Tourists could receive guidance and educational materials to help

them understand the many aspects of South Georgia's history, flora, fauna, and its place in the Antarctic ecosystems. With a less restrictive atmosphere and the perception of South Georgia as a desirable stop in the periantarctic, revenue might be expected which could finance monitoring, museum maintenance, or other administrative costs.

Much of the theoretical and practical framework has been laid and is available to South Georgia through plans such as Macquarie Island and Graefe's VIM system. The development of such a plan would be the next logical step in the evolution of its current conservation policy.

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N. A. I. FRENCH,  
*Governor.*

LS

No. DS 1

1975



Falkland Islands Dependencies

IN THE TWENTY-FOURTH YEAR OF THE REIGN OF  
Her Majesty Queen Elizabeth II.

NEVILLE ARTHUR IRWIN FRENCH, M.V.O.  
*Governor.*

An Ordinance

To amend the law with regard to the conservation of wild animals and birds in the Falkland Islands Dependencies.

Title.

ENACTED for the Dependencies of the Colony of the Falkland Islands by the Governor of the Colony of the Falkland Islands and the Dependencies thereof, as follows—

Enacting clause.

1. This Ordinance may be cited as the Falkland Islands Dependencies Conservation Ordinance 1975 and shall come into force on the 19th day of February 1975.

Short title and commencement.

2. In this Ordinance, unless the context otherwise requires —

Interpretation.

“animal” means any vertebrate or invertebrate including birds, reptiles, fish and insects and the young and eggs thereof.

“native mammal” means any member, at any stage of its life cycle, of any species belonging to the Class Mammalia indigenous to the Dependencies or occurring there through natural agencies of dispersal, as well as reindeer *Rangifer tarandus*, but not including whales and dolphins of the Order Cetacea.

“native bird” means any member, at any stage of its life cycle (including eggs), of any species of the Class Aves indigenous to the Dependencies or occurring there through natural agencies of dispersal.

“native plant” means any kind of vegetation at any stage of its life cycle (including seeds) indigenous to the Dependencies or occurring there through natural agencies of dispersal.

“permit” means a formal permission in writing issued under the authority of the Governor.

Conservation of wildlife.

3. No person shall wilfully, except as permitted under this Ordinance —

- (a) kill, wound, capture, molest or export any native mammal or native bird; or
- (b) collect or destroy any native plant; or
- (c) enter any Specially Protected Area or Site of Special Scientific Interest; or
- (d) bring into the Falkland Islands Dependencies any living animal, plant, virus, bacteria, yeast or fungus of species which are not indigenous to the region; or
- (e) visit or travel on land in any part of the Falkland Islands Dependencies, as a tourist or for any other purpose of recreation, other than in an area for the time being designated under section 14 as an area of Special Tourist Interest.

Exemptions from section 3.

4. (1) Section 3 of this Ordinance shall not be taken to be contravened by anything done, or attempted to be done, by any person in accordance with a permit issued in respect of him under this Ordinance if it is done or attempted to be done when that permit is in force and in compliance with any conditions or limitations to which the permit is subject.

(2) Without prejudice to the preceding subsection, where a person is charged with an offence under section 3 of this Ordinance, it shall be a defence to prove that the act in question was done or attempted in a case of extreme emergency involving possible loss of human life.

Issue of permits.

5. The Governor may issue to any person a permit authorising him to do such of the things mentioned in section 3 of this Ordinance as are specified in the permit. Such a permit shall be drawn in terms as specific as possible and may be issued subject to such conditions and limitations as the Governor considers appropriate.

Permits to collect mammals, birds or plants.

6. (1) Permits authorising persons to do such of the things mentioned in section 3 (a) and (b) of this Ordinance shall be limited so as to ensure as far as possible that —

- (a) the variety of species and the balance of the natural ecological systems are maintained; and
- (b) no more native mammals or birds are killed or taken in any one year than can normally be replaced by natural reproduction in the following breeding season.

(2) A permit authorising any person to do such of the things mentioned in section 3 (a) and (b) of this Ordinance shall only be issued for the following purposes —

- (a) to provide indispensable food for local use in limited quantities, and in conformity with the purposes and principles of this Ordinance;
- (b) to provide specimens for scientific study or scientific information;
- (c) to provide specimens for museums, zoological gardens, or for other educational or cultural institutions or uses;
- (d) to provide for regulating the management and use of living resources.

Permits to enter Specially Protected Areas or Sites of Special Scientific Interest.

7. A permit authorising any person to enter any Specially Protected Area or Site of Special Scientific Interest shall only be issued in accordance with sections 12 or 13, as appropriate, of this Ordinance.

8. A permit authorising any person to bring into the Falkland Islands Dependencies any living animal, plant, virus, bacteria, yeast or fungus of species not indigenous to the region shall only be issued for purposes, and, where necessary under such controlled conditions, as will not cause harmful interference with the natural ecological system of the region.

Permit to bring into the Dependencies animals, plants, etc.

9. The Governor may delegate his powers under section 5 to any person who for the time being —

Delegation of power to issue permits.

- (a) holds office as Director of the British Antarctic Survey or holds an appointment (by whatever name called) having functions similar to those which at the passing of this Ordinance are performed by that Director; or
- (b) is the resident Magistrate in South Georgia.

10. In connection with the matters authorised by any permit, the permit may require the person in respect of whom it is issued to make to the Governor or other person issuing the permit a report, at such times and in such manner as may be specified in the permit, as to the occurrence of such acts and events as may be so specified.

Reporting of action in accordance with permits.

11. (1) Any person to whom the power to issue permits is delegated under section 9 shall, in respect of each year, send to the Governor a report in accordance with subsection (2) of this section, and every such report shall be sent to the Governor as soon as practicable after the end of the year to which it relates.

Report by person issuing permits.

(2) A report made by any person under subsection (1) of this section in respect of any year shall contain such particulars of permits under this section issued by him relating to that year, and of information received by him relating to that year in pursuance of section 10, as the Governor may require.

(3) In subsection (1) and (2) of this section "year" means a period of twelve months ending on 30th June.

12. (1) The areas defined in Schedule A are hereby designated "Specially Protected Areas" and shall be accorded protection in order to preserve their ecological systems.

Specially Protected Areas.

(2) The Governor may, by Order, designate any additional area as a Specially Protected Area which is —

- (a) a representative example of a major land, freshwater, or coastal marine ecological system;
- (b) an area with a unique complex of species;
- (c) an area which is the type locality or only known habitat of any native plant or invertebrate species;
- (d) an area which should be kept inviolate so that in the future it may be used for purposes of comparison with localities that have been disturbed by man.

(3) A permit issued in accordance with section 5 of this Ordinance shall not have effect within a Specially Protected Area except in accordance with subsection (4) of this section.

(4) A permit to enter a Specially Protected Area shall be issued only for a compelling scientific purpose which cannot be served elsewhere, and provided that the actions permitted thereunder will not jeopardise the natural ecological system existing in the designated area.

13. (1) The areas defined in Schedule B are hereby designated "Sites of Special Scientific Interest", and shall be accorded protection in accordance with subsection 4 of this section in order to prevent interference with scientific investigations.

Sites of Special Scientific Interest.

(2) The Governor may, by Order, designate any additional area as a site of Special Scientific Interest which is being maintained exclusively for scientific investigations in a locality where such investigations may be jeopardized by accidental or wilful disturbance.

(3) A permit issued in accordance with section 5 of this Ordinance shall not have effect within a Site of Special Scientific Interest except in accordance with subsection (4) of this section.

(4) A permit to enter a Site of Special Scientific Interest shall be issued only for a compelling scientific purpose which cannot be served elsewhere, and provided that the actions permitted thereunder will not interfere with the scientific investigations for which the Site was designated.

Areas of Special Tourist Interest.

14. (1) The areas defined in Schedule C are hereby designated "Areas of Special Tourist Interest", which shall be open for tourism and recreation.

(2) Subject to the next subsection of this section the Governor may, by Order, designate additional areas representative of wildlife and scenic beauty.

(3) In designating additional areas the Governor shall have regard to the need to monitor the effects of tourists on the natural ecological systems within these areas.

Amendment of Schedules.

15. The Governor may, by Order, amend the definition, or revoke the designation of any area defined in Schedules A, B, or C of this Ordinance.

Penalties.

16. (1) Any person who knowingly contravenes section 3 (a) of this Ordinance, by wilfully killing, wounding, capturing or molesting any native mammal or bird, except as permitted under this Ordinance, shall be liable to a fine not exceeding £150.

(2) Any person who wilfully contravenes sections 3 (b), (c), (d) or (e), except as permitted under this Ordinance, shall be liable to a fine not exceeding £150.

(3) Any person who fails to comply with a requirement imposed on him by a permit issued in accordance with sections 6, 7, 8 and 10, or who in any report made by him in pursuance of such a requirement knowingly and recklessly makes a statement which is false in a material particular, shall be liable to a fine not exceeding £150.

Venue.

17. For all purposes of and incidental to the trial of any person accused of any offence under this Ordinance and the proceedings and jurisdiction of any Court, the offence shall be deemed to have been committed either in the place in which it was actually committed or in any place in which the offender may for the time being be found.

Incidental destruction of native plants and animals.

18. Notwithstanding anything in section 3 (a) or 3 (b) it shall not be an offence under this Ordinance to kill or wound any native mammal or native bird or destroy any native plant where such killing or wounding or destroying is on a limited scale and is the incidental result of an otherwise lawful act.

Governor may make Regulations.

19. The Governor may, from time to time, make Regulations for the better carrying out of the provisions of this Ordinance and the intent and object thereof.

Repeal. (DS2/69).

20. The Application of Colony Laws (No. 2) Ordinance 1969 is hereby repealed.

SCHEDULE A.

Section 12.

SPECIALLY PROTECTED AREAS

Cooper Island lat. 54° 49' S., long. 35° 47' W.

SCHEDULE B

Section 13.

SITES OF SPECIAL SCIENTIFIC INTEREST

Bird Island lat. 54° 00' S., long. 38° 03' W.

Annenkov Island lat. 54° 29' S., long. 37° 05' W.

SCHEDULE C

Section 14.

AREAS OF SPECIAL TOURIST INTEREST

GRYTVIKEN. The area bounded by Moraine Fjord, Hamberg Glacier, Mount Sugartop and Lyell Glacier.

BAY OF ISLES. The area between Cape Buller and Cape Wilson inland to the height of land, together with all the islands and rocks in this bay.

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Promulgated by the Governor on the 19th day of February 1975.

ARTHUR J. P. MONK,  
*Chief Secretary.*

Ref. FIS/10/1.



## GUIDELINES FOR TOURISM OPERATIONS AT MACQUARIE ISLAND NATURE RESERVE

Notwithstanding the following all visitors to the reserve are bound by the Tasmanian *National Parks and Reserves Regulations 1971*.

Visitors shall comply with any direction given by the Station Leader or Department of Parks, Wildlife and Heritage Ranger under the *National Parks and Reserves Regulations 1971*.

### 1. Protection of the Environment

- 1.1 All tourist operations will be ship-based with no overnight stay on the island except in an emergency. Shore visits will only be permitted between the hours of 0700 and 1900 local station time.
- 1.2 The landing and pickup of personnel will only be at beaches designated by the Department.
- 1.3 The areas which may be accessed on foot will be designated by the Department and all shore parties are to be in two-way radio communication with the ship and must not be more than one hour walking time from the beach where they are to be picked up.
- 1.4 Shore parties to be organised in groups of no more than ten people including one leader/guide with each party.
- 1.5 Strict quarantine procedures will be enforced to prevent exotic species being taken ashore in equipment or clothing.
- 1.6 Any food and drink items to be consumed during visits ashore are to be unopened, pre-packed, processed food or drinks, previously approved by the Department.
- 1.7 No food items are to be given to wildlife.
- 1.8 All rubbish and unused food items are to be returned to the ship. No shipborne rubbish, including food items, are to be disposed of in Tasmanian territorial waters.
- 1.9 No collecting or disturbance of flora, fauna, historical sites or artefacts, geological specimens or objects is permitted.

### 2. Protection of Scientific Programs

- 2.1 The Antarctic Division shall keep operators of tourist ships informed by providing up-to-date information regarding its shipping timetable and unscheduled changes. No tourist ship may visit the reserve within four days of an Antarctic Division ship being at the island or within five days of another tourist vessel. Visits by tourist ships shall not coincide with an Australian public holiday, except with the approval of the Station Leader.
- 2.2 Radio contact must be made with the Station Leader at Macquarie Island at least 24 hours before the estimated time of arrival. Also the Station Leader must be advised immediately prior to commencement of landing operations and within one hour of all personnel returning to the ship. In the case of any accidents the Station Leader must be advised at the earliest opportunity. The Australian Antarctic Division is to be consulted on which radio frequencies to use.
- 2.3 Visits to the Australian National Antarctic Research Expeditions (ANARE) station are entirely at the discretion of the Australian Antarctic Division. Such visits will be permitted on one day per ship's visit, and the total number of visitors to the station over the entire season shall not exceed 300. No more than 25 visitors shall be permitted on the station at any time. Commonwealth employees will not be available to guide groups or to conduct explanations of scientific programs,

although tours of the station area may be conducted by Tasmanian Parks, Wildlife and Heritage Rangers. These tours shall be external to the buildings except for the Post Office, where entry is permitted. No fenced areas or experimental sites are to be entered without the approval of the Station Leader and the scientist concerned.

- 2.4 The telephone and radio services of the Macquarie Island Station Communication Centre will not be made available to tourist visitors, and only limited postal services will be available, by prior arrangement with the Station Leader. Philatelic services may be restricted at the discretion of the Postal Agent.
- 2.5 Visitors shall not enter field huts, nor use supplies from field huts except in an emergency. Any supplies used shall be reported promptly to the Station Leader and replaced by the tourist vessel if possible.
3. **Safety of Visitors and ANARE Personnel**
  - 3.1 The mode of ship to shore transport will be agreed upon between the Department and the tourist operators and only varied with prior written permission of the Director.
  - 3.2 Emergency equipment as agreed to by the Department, and sealed emergency food packs sufficient for all personnel ashore for two days will be on the landing beach while parties are ashore.
  - 3.3 At least one person from each shore party will be qualified in first aid and hypothermia management techniques. This may be a ranger if one is attached to the party.
  - 3.4 The maximum number of tourists ashore at one time shall be determined in consultation with the company such that all can be returned to the ship within three hours.
  - 3.5 Shore visitors must be suitably briefed on safety requirements and be appropriately clothed.
  - 3.6 A charge of \$A100 will be made for each paying passenger onboard a commercial vessel, or person onboard a private vessel. The revenue from this will be used to cover the costs of providing Ranger supported facilities to protect the environment while catering for visitors, and to any other management program in the reserve considered necessary by the managing authority.
  - 3.7 The tourist operators will be required to expressly accept the responsibility for any costs incurred by the Tasmanian Government and Commonwealth relating to provision of search and rescue or emergency assistance to tourist visitors in the Macquarie Island Nature Reserve.

Tony Pedder  
SECRETARY

August 1989

[These guidelines applied to the 1990-91 season. It is intended to review such guidelines after each season.]